



TRansition paths to sUustainable  
legume-based systems in Europe

**Deliverable 7.2 (D41), Report, Public**

## **Co-production of the Policy assessment**

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## Deliverable Description & Contributors

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- **Deliverable Title:** Co-production of the policy assessment
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- **Deliverable description:** From the conceptual and methodological approach established in Task 7.1, we generated an analytical framework to determine how actual policies and governance solutions enable or limit legume production. The analysis was based on the assessment of a range of publications and interviews with key stakeholders at the EU, regional and national level. The policy document analysis was orchestrated by ESSRG and involved all partners in gathering data on regional and national level policies. Main interview themes covered the following questions: (i) what are the practical policy challenges?; (ii) what policy approaches already exist?; (iii) what is the most needed policy change?; (iv) how can different stakeholder interests be embedded in policy processes?; and, (v) what are the main learnings lessons for various policy communities? Co-production of research results were achieved by involving stakeholder groups in assessing existing policies via regional meetings of the European Legume Innovation Network workshops.
  
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## Executive Summary

1. Policies are an essential and key determinant of agri-food systems functions, and the **incoherence among policies across sectors is a primary hindrance** to the transformation towards more sustainable system states. Thus, understanding policy incoherencies is the first step in engaging multiple stakeholders and decision-makers to envision more favourable policy and governance frameworks.
2. The policy environment for legumes must span all sectors of the supply chain, and legume-focused policies are often absent. Where they do exist, they are confusing and juxtaposed with **complex set of regulatory, market, and societal factors** that influence stakeholders' approaches and decisions.
3. Several levels of inconsistent and even contradictory policies and policy actions coexist to maintain the **unsustainable-system lock-ins**. Policy incoherence is further enhanced in the gap between rhetoric and reality – the problem of policy implementation.
4. Examples of policy inconsistencies for legume-based food systems are presented from Europe and beyond. Altogether the individual policy initiatives show incoherence for legume focused innovation:
  - a. increasing legume consumption is catered through imports;
  - b. protein strategies oriented towards industrialised livestock production;
  - c. agricultural policy effective in different ways in different countries;
  - d. a lack of knowledge transfer characterises research and innovation;
  - e. trade policy is dependent on demand by China leading soy production and trading prices.
5. Some successes are highlighted: home-grown legume consumption is successfully increased by Public Food Procurement (in Portugal), and home-grown soybean production is increased in Italy, Germany, France and Poland. Health and nutrition are new focal points of consumer policy, but most often omit legumes.
6. The marginal role of home-grown legumes in agri-food systems illustrates '*pars pro toto*' that 'locked-in' to unsustainable states, such as a heavy reliance on inefficient use of synthetic nitrogen, systematically obliterate the true economic, social and environmental benefits of home-grown legumes.
7. Public funding for legume production and consumption would provide clear opportunities for synergies, as '**sustainable diets**' might be a policy goal that is most widely acknowledged.
8. The role of **new methodologies required** are highlighted for policy analysis to enable science-society-policy interfaces that create policy environments that meet current and future food and nutritional security challenges.





## 1. Introduction

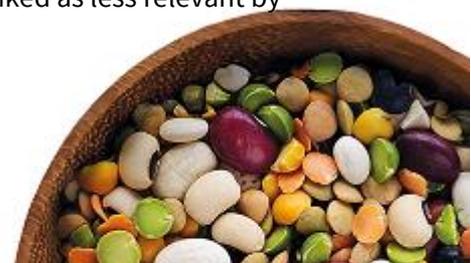
The primary objective of the policy report D7.2 is to provide a ‘critical analysis of existing policies and governance solutions for legume-supported systems’, which help identify limiting and enabling factors as well as leverage points for further policy interventions to support legume-based systems. This objective is achieved by a combination of systematic reviews and key stakeholders’ interviews, which goes beyond a classical policy document analysis and sheds light on the actors, networks and processes which are key to create effective policy solutions. In this deliverable, we refer to ‘policy’ in a broad sense, not only considering legal regulations (Laws, Decrees, Strategies etc.) as the policy framework but also including public and private initiatives which aim to change or implement the framework conditions.

The main questions to address in this deliverable include the following:

1. What are the practical policy challenges to increase legume production and consumption in Europe?
2. What is the most necessary policy change at European and country level?
3. What policy approaches already exist?
4. How can different stakeholder interests be embedded in policy processes?
5. What are the main learnings lessons for various policy communities?

Deliverable 7.2 follows the TRUE Report on the Co-design of Policy Analysis (Deliverable 7.1), which outlines the methodological approach for the current policy assessment, identifies the policy fields which currently have or could have in the future significant impacts on the European legume-based systems, and provides a preliminary assessment for key policy fields based on a literature review. This report broadens the scope of the previous deliverable and aims at a more in-depth policy analysis, co-produced by TRUE consortium partners and stakeholders participating at Legume Innovation Network (LIN) Meetings.

Prior to this policy analysis, stakeholders and project partners met at three regional LIN workshops (Continental (C-LIN), Germany, 21-22 November 2017; Atlantic (A-LIN) UK, 13-14 December 2017; and Mediterranean (M-LIN), Greece, 20 April 2018) and shared their experiences regarding the policy challenges they face, as well as the opportunities, they envision in their regions for policy change. As a result of these discussions, the main policy challenges have been identified as shown in Table 1. Additionally, several future opportunities for policy improvement have been suggested by workshop participants, either applicable at the national/regional level, or the EU-level, as listed in Table 2. Challenges and policy options discussed at the LIN meetings are partly in line with the [Stakeholder Survey launched by the EC](#) on 19<sup>th</sup> February 2018 about the future of protein crops, although LIN meeting outcomes highlight some additional aspects and regional specificities as well. A key challenge identified at all three LINs is the lack of knowledge and capacities (related to both legume production and consumption), which echoes ‘research and innovation’ ranked by the survey as the highest priority for the EU plant protein strategy. LINs, on the other hand, addressed more centrally the linkages between regional supply and demand, the integration across food and feed supply chains, and the importance of consumption patterns, which were ranked as less relevant by the EC survey respondents.



**Table 1** Policy challenges, identified by TRUE Legume Innovation Network (LIN) workshops (challenges listed in random order) where A, C and M denotes the Atlantic (and Boreal), Continental and Mediterranean-ELIN workshops respectively.

Policy challenges	Level	A-LIN	C-LIN	M-LIN
Lack of quality standards	national/regional		x	
Lack of <b>knowledge/need for capacity building and knowledge sharing</b>	EU	x	x	x
Lack of connection between local producers/processors and international traders/suppliers in the food sector	EU		x	
Difficulties of bridging regional supply and demand (decoupling from import in the feed sector, labelling food as regional, creating Short food supply chains in the food sector)	national/regional		x	
Profitability is <b>questioned by farmers (pest control, variable yields, not competitive with soya bean, difficult to internalise external costs)</b>	national/regional	x	x	
Compartmentalisation, lack of coherence and polarisation of policies at EU level	EU		x	
CAP's <b>intense focus on production without sufficient support along the value chain, no direct focus on legumes</b>	EU	x	x	
<b>The huge decrease of production and consumption of legumes</b>	national/regional		x	x
Overuse / inefficient use of synthetic nitrogen	national/regional	x		
Challenges of breeding programmes (lack of <b>state-financed programmes, few investments, lack of testing local varieties...</b> )	national	x		x
Public perception of pulses - not attractive enough (protein quality, antinutrients, variable yields...)	national/regional	x	x	

The above lists of key policy challenges and opportunities have been used in D7.2 to select case studies for in-depth policy analysis. The selection covers some of the significant issues raised in the LIN meetings (such as the lack of knowledge, the (in)effectiveness of agricultural policies, the impact of trade policies, and the role of consumption on legume-based systems) and provide a better understanding of how different policy interventions can manage such challenges.



**Table 2** Future opportunities for policy improvement, identified at the TRUE LINs (options listed in random order)

Policy Options	Level	A-LIN	C-LIN	M-LIN
Raise awareness, improve knowledge (both at the producer and consumer sides), better extension services, peer-to-peer learning	EU, national	x	x	x
<b>Influence/change public food services (public procurement, new food standards, replace cheap meat with legumes)</b>	EU, national	x	x	
Limit soybean import	EU		x	
Stronger restrictions on synthetic nitrogen use	EU, national	x	x	
Build strong stakeholder networks, provide integrated support along the value chain (incl. <b>small-scale producers and processors</b> )	EU, national	x	x	
Legal standards for <b>greening/support rotation systems</b>	EU, national	x	x	x
Results based agri-environmental payment <b>system/payment schemes supporting the public goods provided by legume production</b>	EU	x	x	
Promote ecological <b>health/ecosystem approach at the EU level</b>	EU	x		x
Support good cultivars / incentivise farmers to use the right seeds / support region-specific breeding	EU, regional, national	x	x	x
Voluntary coupled support focusing on legume production	National			x
Eliminate subsidies in farming	EU			x

The deliverable is structured into six main sections. This introduction is followed by a detailed description of the methodology (Section 2), including some basic facts on the data analysed. The third section explains the legume-paradox, highlighting policy bias, exclusion and dependencies to discourage sustainable-production and -consumption related to protein crops. The fourth section is devoted to the analysis of EU-level policies which either directly or indirectly influence legume production and consumption. Policy fields targeted in this chapter include agriculture; environment; climate change; nutrition, diet and health; green public procurement; and trade policies; as well as the European Plant Protein Strategy. Section 5 presents country-level examples of how different policy solutions affect the production and consumption of legumes in different regions, both within and beyond Europe. Section 6 sums up the main lessons learnt and lists the





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primary limiting and enabling factors for legume-based systems in Europe, while the closing section draws some general conclusions and outlines the next steps for TRUE WP7.



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## 2. Methodological background

### 2.1. Overall research approach

D7.2 applies a threefold strategy to carry out policy analysis with the help of partners in the consortium and beyond:

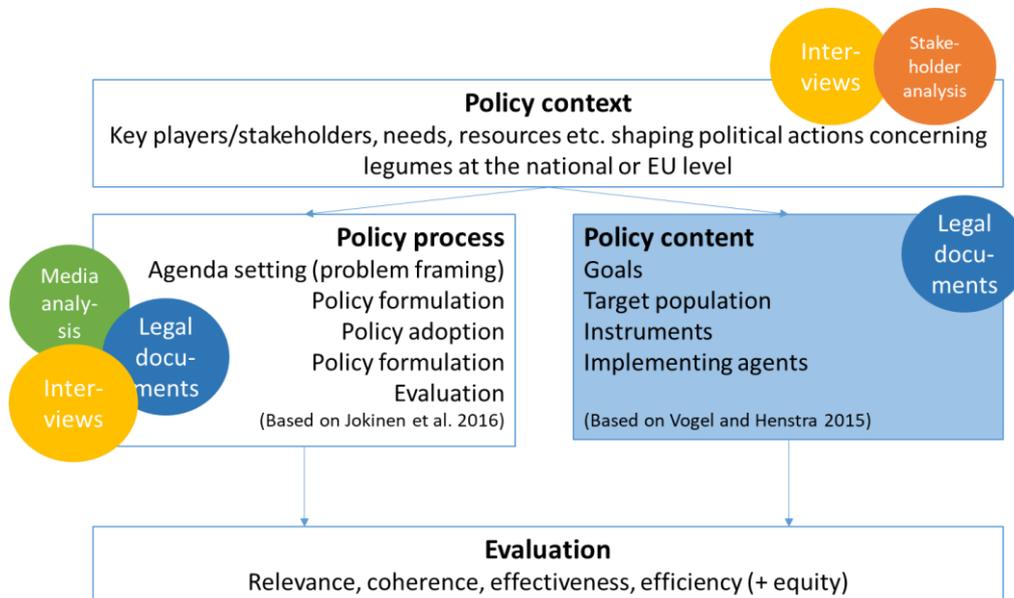
- A) **Literature review and document analysis** have been used to outline the major impacts of key policy fields on legume-based systems at the EU level. The main objective has been to analyse how current EU-level policies (and in some case the evolution and interplay of those) influence the production and consumption of legumes in Europe. The methodology has combined an in-depth literature review combined with the analysis of key policy documents (e.g. the European Protein Strategy). Online databases (e.g. ScienceDirect) have been searched for peer-reviewed articles focusing on the policy and governance aspects of legumes, which have then been critically reviewed. Results are shared for major policy fields.
- B) **In-depth, interpretive policy analysis** (Yanow 2006) has been applied to selected cases. The main objective has been to better understand policy formulation by revealing underlying values, arguments, as well as the interplay of actors, which conclude in a specific policy content (represented by its goals, target population, instruments, and implementing agents). The format has followed an interpretive policy analysis using data from official legal/strategic documents and key informant interviews, if necessary. As the in-depth analysis requires more time and skills in social scientific research, only a handful set of policy examples (8 cases) has been analysed in this way, mainly at the national level.
- C) **A short template** has been created to enable the collection of primary data on policies relevant to legume production and consumption all over Europe. The main objective was to collect examples for policies implemented at different spatial scales (from local to regional, national and EU), going beyond the scope of this deliverable. This brief template asks for key information on existing policies, which allow the creation of future repository of available policy solutions together with geographical representation. The long-term expectation is to crowd-source data collection and create a repository, where any partner or stakeholder in TRUE (and later in the European Legume Innovation Network) can enter relevant information and incorporate their case into the repository. Such a repository is planned to be accessible online throughout the TRUE website, integrating search functions. Annex I showcases how such a ‘template approach’ can help gather relevant information about policy solutions at various locations and scales.

In the next two sections, the analytical framework for the in-depth policy analysis is described in detail, and some key information about the data collected and analysed for D7.2 is provided.



## 2.2. Analytical framework for the in-depth policy analysis

The in-depth policy analysis of D7.2 follows a case study approach (Yin 1981). We consider a contemporary policy solution or governance approach as the unit of analysis together with its context. As Figure 1 suggests, we differentiate three key characteristics of a policy solution as the subjects of our analysis: the context, the process and the content of the policy (Carey *et al.* 2016, based on the policy triangle by Walt and Gilson, 1994). Each of these subjects can be characterised by the major actors shaping them, as well as other elements (*e.g.* the phases of the policy process or the goals and instruments of the policy) clearly defined by literature (see, *e.g.* Jokinen *et al.* 2016 and Vogel and Henstra 2015). During the policy analysis, data were gathered about these elements from various sources and then analysed according to core analytical aspects, identified *a priori* (the detailed guideline for data collection and analysis is shared in Annex II).



**Figure 1** The analytical framework of the TRUE in-depth policy analysis

During the in-depth policy analysis, focus was mainly given to the policy content, analysing legal/strategic policy documents (blue box in Figure 1). However, to better contextualise the impacts of individual policies, analysing the policy-context and -process was of high added value. Conducting interviews with key informants was a useful way to collect information on contextual and procedural factors. Interviews can also be used to analyse the interaction between key stakeholders. In addition to interviews, white and grey literature, as well as media presence can also be useful data sources to conceptualise the policy cycle.



In the TRUE project, our main research questions focus on the arguments, the underlying values and the interplay of actors, which together shape the policy content and its real-life impacts. Therefore, the key analytical questions to address in during the analysis are:

- What arguments are used by different stakeholders to frame the problem, define the goals and assess existing instruments (or expected outcomes)? How are legumes represented within these lines of argumentation? Which *pro* and *contra* arguments are used for producing and consuming legumes?
- What are the underlying value propositions of the given policy? Are there any visible value conflicts? How are underlying values represented in the policy instrument itself (*i.e.* the rules of entitlement)?
- How do actors interact in the policy sector? Are there equal opportunities to influence the policy process and shape the content? How does power shape the outcome of the policy process?

As a result of the analysis, a storyline is developed for each of the policy solutions assessed. According to Yanow (2006), interpretive policy analysis can be carried out in various ways, including frame analysis, dramaturgical analysis, category analysis, as well as narrative analysis and storytelling. The two latter methods are relatively similar approaches focussing on the individual's interpretation of policy issues through the language, arguments and actions of policy-relevant actors (Nowlin, 2011). In D7.2 case study analysis on existing policy solutions tells the story of how the given policy has been formulated and how it enables or limits legume production and consumption from different actors' point of view. This allowed context-specific factors to remain central in the analysis, while at the same time makes comparison across cases possible. Storytelling also allows the sharing of the results widely, *i.e.* within and beyond the TRUE community, as the stories told about each policy issue described parallel interpretations, which can resonate with individual stakeholders.

### 2.3. Data used for the policy analysis

#### Literature review

ScienceDirect and Google Scholar databases were used for a structured literature search. Search terms included the following: 'legum\*' OR 'pulses' AND 'policy analysis' AND 'Europe'. Papers published in the last five years (no. of hits was above 4800) were listed according to relevance, and the first 50 abstracts were screened for empirical content and relevant policy fields. Additional papers published before 2014 have been reviewed if they were cross-referred by several other papers or focussed on some less frequently addressed policy fields. In addition to peer-reviewed scientific literature, some key EU-level policy documents were also analysed on how they influence legume production or consumption (*e.g.* the European Protein Plan, Green Public Procurement or the 7<sup>th</sup> Environmental Action Plan).



### In-depth policy analysis

In-depth policy analysis was carried out in Argentina, Croatia, Denmark, Germany, Hungary, Italy, Portugal and Scotland. In each country, researchers have focussed on one focal issue, and relevant policy documents at the national level identified and analysed in detail. Altogether one international, 6 EU-level, 29 national and 14 regional (sub-national) policy documents were analysed by project partners (for a detailed list, *c.f.* Annex II). In addition to document analysis, 24 interviews were carried out with different stakeholders (incl. producers, processors, lobby groups or professional networks, extension service providers and policy makers). The length of interviews – either carried out face-to-face or online – ranged between 30-90 minutes. Written notes were taken, focusing on experiences and opinion of the interviewees on policies regulating legume production and consumption. Four cases reports were complemented with media releases analysis. Table 3 summarises the breath of the data used for the in-depth policy analysis.

**Table 3** Data collected and analysed for the in-depth policy analysis

Country	Policy field	Level of analysis	Protein crop	Policy documents	Interviews	Media analysis
<b>Argentina</b>	Trade and agriculture	National, international	Soybean	14	0	yes
<b>Croatia</b>	Agriculture and extension services	National	All, from a producer perspective	4	1	yes
<b>Denmark</b>	Public food procurement	EU, national	All, for human consumption	1	18 <sup>1</sup>	no
<b>Germany</b>	CAP and protein strategy	Regional, National, EU	Soybean	17	17	no
<b>Hungary</b>	Public food procurement	National	Pulses, for human consumption	3	4	yes
<b>Italy</b>	CAP and protein strategy	National, EU	Soybean	4	4	yes
<b>Portugal</b>	Public food procurement	National	All, for human consumption	3	0	no
<b>Scotland</b>	Agriculture	National	All	1	1	yes

<sup>1</sup> In Denmark 6 interviews were conducted and a focus group organised with 12 participants.



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## 3. The Legume Paradox

### 3.1. Definition

In our previous policy report (Balazs *et al.* 2017) the ‘legume-paradox’ of the European agri-food systems was described. The paradox highlights the policy bias, the exclusion and dependencies to discourage sustainable-production and -consumption. The current situation (high legume consumption but low legume cultivation) is attributed to the relatively high and stable yields provided by cereal crops, despite their dependence on high levels of inputs (especially regarding nitrogenous fertilisers). In fact, in terms of gross margins, it has been demonstrated that if cultivated well, grain legumes can be the most profitable crops of the rotations (*e.g.* Nemecek *et al.* 2015, Preissel *et al.* 2015). Added to this, legumes are becoming increasingly commercially competitive with cereals, though challenges remain.

Legume crops are an essential constituent of global agriculture and are essential for food security in many regions. They commonly accompany cereals in providing the staple diet for people and their farmed animals. Legumes are unique among crops in being able to ‘fix’ di-nitrogen gas from the air into a form that is biologically useful within plant structures (such as foliage and seeds) which are used for food and feed. This provision arises largely from legumes’ capacity to carry out biological nitrogen fixation (BNF) – whereby atmospheric di-nitrogen gas is ‘fixed’ into. In doing so, legumes need no, or very little synthetic nitrogen fertiliser, to ensure production. The potential benefits of legumes to agri-food systems include: enhancing nutritional provision; enabling natural nitrogen cycling and reducing synthetic nitrogen fertiliser use - so reducing Green House Gas (GHG), production and eutrophication while increasing soil-qualities and functional diversity of the farmland above- and below-ground farmland food web. Legumes are therefore multi-functional and encourage many essential socio-ecological processes that could underpin sustainable agri-food systems.

However, while the European agri-food system is highly dependent on legumes as a source of protein to sustain mainly meat production, these are imported. Currently, 70% of Europe’s protein requirement is met from imports and mainly in the form of soybean. In parallel, the crop-sequences of European agricultural production systems encompasses very low levels of legume inclusion (in the order of 1-4%). Consequently, this exclusion of legumes means that European production systems cultivate mainly synthetic fertiliser dependent crops, and ironically most of that production is to maintain less environmentally efficient feed, *i.e.* not direct-food, markets (*c.f.* Magrini *et al.* 2016). Where legumes account for a significant portion of crop rotations, *e.g.* Canada – grain legumes (22%) and New Zealand – forage legumes – (15%), these drives respectively export markets for feed for animals or meat directly. That is, where legumes are included at sufficient levels it does not serve environmentally sustainable agri-food systems. Instead, they aid the global meat markets.

Legumes have unique agroecological benefits that potentially could raise their profile in food policy debates. Controversially, legumes are only exceptionally found at the centre of food policy debates on global food and nutrition security or sustainable agri-food systems (see, *e.g.* the Morocco Declaration on Pulses, Agrawal, 2017). Even in these contexts, they encourage industrialised food production focused on single crops and at the expense of local food cultures and the encouragement



of unsustainable consumption. Often defined as “meat analogues”, legumes feature in the context of population growth and a shrinking small-scale farming sector (FAO, 2016). A diverse set of regionally-essential legume species, called ‘orphan crops’ receive only very little scholarly and policy attention compared to the main traded grain legume commodities. Legumes may already be leading a green food revolution (Tenkouano, 2011) since they have been identified as essential to help maintain above-threshold levels of essential nutrients and balanced diets when cultivated in small areas within backyards or home-, school- and community-gardens for the facilitation of social eating and nutritional security with the minimal of resources (Keatinge *et al.*, 2012).

### 3.2. Reasons

While the global agri-food, or rather mainly animal (and aquaculture) feed- and -meat markets, primarily act to exclude home-grown legume production, there is an agreement in the EU-research and -policy communities regarding the overall utility of reintroducing protein crops, mainly legumes, to improve the sustainability of European agri-food systems. Also, on the EU level, a transition from an agrochemical-dependant- to an agroecological-dependant-paradigm has been suggested many times (Häusling, 2011; Helming *et al.*, 2014; Rees *et al.*, 2015; Magrini *et al.*, 2016, IYP, 2016). For instance, Bues *et al.* (2013) explored how to increase the production of protein crops in Europe and identified nine policy solutions: six inside the CAP (Common Agricultural Policy), and three outside. This study contended that an integrated approach would be desirable that combines ‘Greening Measures’, investment in research, and constraints on the use of synthetic nitrogen fertilisers. However, such *Greening Measures* as introduced under the last reform of the CAP (2013), have been assessed as environmentally ineffective (ECA 2017, CEEweb 2016)

Specific policy incentives could change the low level of legume cultivation in Europe. Topp *et al.* (2014) carried out a comparative impact-simulation for six legume-supportive policies for grain- and forage-legume types. They contended that the CAP could help by incorporating an ‘integrated package’ on pulses and that the most significant effects could be reached only through the regulation of international trade (*i.e.* limiting grain legume and especially soybean imports), and policies geared to enable legume-supported adaptive- or mitigation-activities to lower agri-food systems emission of GHG and to combat climate change. This extends to encouraging more sustainable consumption habits - especially since the Intergovernmental Panel on Climate Change (IPCC) highlighted the importance of such policies in their fifth framework report. It is unclear though to what extent this recommendation has been embodied in policies since its introduction.

EU policy narratives aim to present the economically competitive advantages for the EU on the world markets. Existing policies could be re-designed to ensure the value of home-grown legume-based agri-food systems. Currently, the EU does not have a coherent single agri-food policy, and the policy relating to production and consumption are scattered and remain to be harmonised. This results in conflicting policies: on the one hand, the EU seeks to diminish the environmental footprint of agriculture, and on the other it would cater for the growing demand for animal protein from the food and feed industries. Under the current EU Horizon2020 flagship for innovative policy strategies (aiming to increase employment and economic growth), the EU acknowledges the co-existence of the often-contradictory needs under the ‘open-market principle’. Furthermore, policies that impact home-grown legume-based agri-food systems operate across many levels of governance shaped by



international, EU, national and regional agreements. In essence, EU policy goals are controversial since they desire to achieve sustainable consumption and available diets do not connect to the necessary agri-business and socio-ecological aspects. EU policy foresight documents also highlight the tensions and competition between achieving food security, environmental protection and climate action. However, any mention of legumes or pulses is scarce and indirect.

Several science-policy initiatives recently contended that our agri-food systems face enormous problems: the Economics of Ecosystem and Biodiversity for Agriculture and Food (TEEBAgriFood), the International Panel of Experts on Sustainable Food Systems (IPES-Food), and the UN Decade of Action on Nutrition 2016–2015, to name a few. Their common diagnosis is the requirement for policy coherence and the need for better governance for sustainable agri-food systems.

The current agri-food systems which render legumes marginal in the EU due to several factors. For example, Magrini *et al.* (2016) and Annicchiarico (2017) argued that “*path dependencies*” might play the central role. Technically, this is attributed to the ready availability of low-cost synthetic nitrogen fertilisers. However, the demise of legumes in the farmed system pre-dates the large-scale introduction of synthetic nitrogen fertilisers. Thus, the war- and post-war periods of the early 20<sup>th</sup> century have been identified as key historical periods whereby industrialising of the agri-food system intensified. This resulted in much higher support and investment choices that supported de-diversification of the farmed system that included a reduction in mixed arable-livestock farming and range of species cultivated by any one farm, to specialist units focusing on a very narrow range of species. Most recently, these specialist systems have been consolidated through EU production-focus aids, funded public research, *etc.* It is these more recent historic policy developments which have therefore compounded synthetic fertiliser dependency for mainly small grain and cereal-based commodities, and as opposed to legume-based cropping systems. Thus, inexpensive energy and especially fossil fuel was decisive for the simplification, specialisation and intensification of our agri-food systems.

Finally, the preference for imported soybean as the primary protein feed source, was encouraged by the US President Kennedy policies underpinned by the Blair House Agreement (1992) between Europe and the USA, precluded the need for legume supported agri-food systems across Europe, and encouraged the unsustainable ‘lock-ins’ of production and consumption, with consequent environmental, social-health and food-culture ramifications.

Therefore, the unsolved question is still: **what are real policy objectives for sustainable agri-food system? How could we transition or transform into a sustainable, legume-based system?**



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## 4. EU policy and governance perspectives for legume-based systems

### 4.1. Environmental policies

The 7<sup>th</sup> Environment Action Programme guides the EU environmental policy to 2020 and created a vision stating that:

*"In 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society."*

Legume-based systems can have a significant environmental contribution to soil fertility, carbon capture, fertiliser reduction, water quality improvement and GHG emission reduction. From a policy perspective, the Nitrates Directive and the Water Framework Directive have the potential to raise the relative economic performance of legume-based systems indirectly. Environmental problems caused by fertilisers and pesticides have already been widely acknowledged in EU policy reports. However, the implementation of the EU policy on Sustainable Use of Pesticides (2009/128/EC) is found "insufficient" (COM 2017), and it is similar with the N-fertiliser usage, which accounts for half of the fossil fuel energy in agricultural production systems (EU (2015/2225(INI))). In addition, in line with the Roadmap to a Resource Efficient Europe (COM (2011) 571) at the levels of production-system and cropping-system, legumes can decrease fertilisers, mitigate GHG, and interrupt the build-up of pest populations.

### 4.2. Climate change mitigation policies

The climate mitigation potential of legumes has most often been studied in the context of policies addressing the EU 2 °C target temperature reduction, which is highly dependent on greenhouse gas (GHG) mitigation estimates in agriculture, technological advancements and dietary changes. Estimation of the impacts of changing technology and consumer demand on food-related GHG reduction calls for radical decreases in meat consumption (increase in demitarianism), and a compensatory increase in legume cropping (*c.f.* Bryngelsson *et al.*, 2016).

The mitigation potential of legume crops is preferred for its low cost of implementation. A recent French study (Dequiedt and Moran, 2015) claims that legumes could decrease chemical fertiliser emissions by 7% and deliver a cost saving through synthetic fertiliser offset of € 77 million. Thus, carbon pricing in agriculture may be more efficient than a uniform regulatory requirement for including legumes in arable systems. An increase in the cost of carbon emissions by taxing GHG emissions at a relatively high rate would make synthetic nitrogen fertiliser more expensive, and thus legumes more attractive. The 'Report on EU AGRICULTURAL OUTLOOK - Prospect for the EU agricultural markets and income 2016-2026' only mentions legumes linked to climate contexts as a GHG mitigation policy option by which the high GHG costs of the EU meat market may be offset.



For example, a policy imposing a 15 % mandatory GHG emission reduction introduced for the EU livestock sector could have adverse effects upon production assuming no additional support is given to farmers. However, pulses were mentioned only once as a nitrogen-fixing crop and are reduced to a minor role in Greening Measures on ecological focus areas (EFAs). The overall mitigation achievement and contribution by new technologies such as anaerobic digestion and improving nitrification inhibitors (million t CO<sub>2</sub> eq mitigated, EU 28, 2030) identified only a marginal role for legumes.

### 4.3. Nutrition, diet and health policies

Policy studies of consumption by the EU food legislative framework have also highlighted the need for policy coherence (c.f. *‘Scoping Study – Delivering on EU Food Safety and Nutrition in 2050’*, 2013). *‘The Europe 2020 Strategy, ‘A resource-efficient Europe’*, also pressed for policy incentives for healthier and more sustainable consumption of food. Lowering the environmental impact of food production and consumption patterns has been a primary concern for the EU sustainable food/diet policies. According to the *‘European Food and Nutrition Action Plan, 2015–2020’*, dietary factors are crucial for the health and well-being of European societies. In Europe, non-communicable illnesses such as cardiovascular disease, diabetes, cancer and respiratory diseases together account for 77 % of the burden of disease and almost 86 % of premature mortality (c.f. EUR/RC67/9 Roadmap).

Nutritionists press for sustainable diets based on high consumption of fresh vegetables, fruits, nuts and legumes. From the Scoping Study *‘Delivering on EU food safety and nutrition in 2050’* (Mylona *et al.*, 2016) and scenarios considering future climatic changes and policy responses (EC, 2013), authors concluded that cross-cutting policy measures would be vital for the future of EU food safety and nutritional qualities. Therefore, EU level policies need to strengthen cross-cutting collaboration among policy Directorate Generals (SANCO, Agriculture, Environment, Trade and Research).

The study also pointed out that policy measures, research programmes and projects to address both consumer- and producer-behaviour jointly are needed, mainly to improve education and communication. Notably, a range of incentives to induce behavioural change can potentially be applied at all levels of the food chain, from primary production (e.g. concerning more sustainable production methods), to marketing and pricing of products (e.g. better nutrition labelling, possible fees, charges or taxes on unhealthy or unsustainable products) and on to consumption (e.g. measures to reduce meat consumption). These would need to be complemented by relevant education and communication measures such as in relation to nutrition-related knowledge, emphasising the advantages and lifestyle value of a plant-based diet, as well as ensuring adequate skills, time and physical-resources for cooking, as a lack of awareness and opportunity in these areas increases the likelihood of processed food consumption.

Acknowledging and accommodating holistically the interlinked qualities of food, nutrition and health as essential components of food security featured during the policy discussions at the World Food Summit in Rome, in 1996 (c.f. e.g. [FAO Monitoring Progress](#)). Historically, nutrition policy has always lagged nutrition science, though more recently this position has started to change. In health, the EU extended its policy reach through the European Food Safety Authority (EFSA) and the EC Directorate General (DG) SANTE which commissioned a foresight analysis on, *‘Delivering on EU Food*





*Safety and Nutrition in 2050 - Scenarios of future change and policy responses*". The report acknowledged that the supply of animal protein for human consumption (meat and milk) may become increasingly difficult due to significantly higher demand for feed protein, mainly as a function of population increases, and especially in developing regions of the world where living standards are increasing (Food Chain Evaluation Consortium, FCEC 2013). Member state governments also started a cooperation in the [EU Platform on Diet, Physical Activity and Health](#) (EUPDPAH), with currently 32 European-level umbrella organisations as members. The EC also launched an EU-level Research & Innovation Policy Framework to future-proof our nutrition and food systems, called [FOOD 2030 - EU Research & Innovation for tomorrow's nutrition and food systems](#).

The existing conventional food system is a critical determinant of sustainable consumption and nutrition, malnutrition and obesity. A recent World Bank report clearly states that fruits, vegetables and legume-based products should be supported at the expense of cereals, palm oil and sugar, while the subsidies and price support mechanisms for unhealthy ingredients should be abandoned. Furthermore, to find pathways to new more sustainable agri-food systems and innovative policy solutions (e.g. dietary guidelines) greater civil society engagement and more effective public-sector research and education efforts are required (Abarca-Gómez *et al.*, 2017).

Healthy, that is nutritionally adequate and environmentally sustainable diets, and sustainable nutrition security is a new research and policy agenda that has recently gained considerable acknowledgement from academics, public policy and civil society groups (van Dooren *et al.*, 2014; Gustafson *et al.*, 2016; Haddad *et al.*, 2016; Mason and Lang, 2017). Nevertheless, legumes and pulses are relatively invisible actors in health policy. A 2015 JRC policy foresight assessing the role of EU policies for global food security called for a 'Common Food Systems Policy', but failed to even mention the protein crops, pulses or legumes (Global Food Security, 2030).

Food systems affect health through multiple, interconnected pathways (IPES-Food 2017). Although diet is the most obvious link by which agri-food systems affect health, the role of legumes to provide solutions to the double burden of inadequate dietary intake (undernutrition) and excess food intake (overnutrition) in an unequal world is not widely considered or understood<sup>2</sup>. To enable the EU to meet Sustainable Development Goals (SDGs) Dora *et al.* (2015) argues that a range of health-related indicators would be helpful to raise awareness of the gains that may be achieved from sustainable development policies, thus making them more attractive to decision makers. Aligned with agroecology principles, Rööös *et al.* (2016) introduced the concept of 'ecological leftovers' for livestock production, *i.e.* that arable land should primarily be used to produce plant-based food for humans, and that livestock should be fed biomass unsuitable for, or not wanted by, humans. They argue that any increase in demand for animal products should be avoided, while diets that fulfil nutritional recommendations and reduce the environmental impact require a reduction in meat consumption.

Therefore, there seems to be a consensus on a sustainable and nutrient-rich diet (ovo-lacto-vegetarian and pescatarian) that may provide optimal synergy between nutrition-health and

<sup>2</sup> More than half of EU adults (52%) are considered overweight and one seventh of the EU population are obese (body mass index greater than 30), with national figures ranging from Romania (9%) and Italy (11%) to Hungary (21%), Latvia (21%) and Malta (26%). See e.g. EUROSTAT - 203/2016 European Health Interview Survey: [here](#).



environmental-sustainability (Springmann *et al.*, 2016; van Dooren *et al.*, 2017). However, without appropriate and careful reframing, science-based health and environmental sustainability arguments in favour of a diet-change will not be sufficient to engage stakeholders and beneficiaries (*c.f.* de Boer and Aiking, 2017). Still, markets for plant-protein and -fibre based diets are rapidly growing (Logatcheva and Galen, 2015).

#### 4.4. Green public procurement policies<sup>3</sup>

On February 26<sup>th</sup> 2014 the Council of the European Union and the European Parliament adopted a new directive (Directive 2014/24/EU) aimed at simplifying and increasing the flexibility of public procurement. These new rules had to be incorporated into national law by April 2016 by all EU countries and seek to ensure greater inclusion of common societal goals in procurement processes. These goals include environmental protection, social responsibility, innovation, combating climate change, employment, public health and other social and environmental considerations. Hence, the [\*Directive 2014/24 covers the framework for Green Public Procurement \(GPP\)\*](#). The GPP targets all goods and services purchased through public procurement processes at all governance levels. GPP is a voluntary scheme; that is, the Member States and public authorities can determine the extent to which it is implemented (Boyano *et al.*, 2017). As procurements by public authorities represent an immense buying power, they can act as a catalyst to make European society greener by encouraging a transition towards more environmentally friendly products and reduced fossil fuels dependencies. We identified specific areas to achieve this goal, where public procurement is thought to play a significant role. With regards to food and catering services, the most critical goal is reducing the environmental impact. Table 4 summarises how this overall goal can be broken down to a set of sub-goals, that can be operationalised through public procurement criteria, which are the specifications that the procuring authority defines in the ‘call for tenders’ and which a supplier must fulfil.

<sup>3</sup> This section uses material from TRUE Deliverable 4.4 (D26) on Public and Private Procurement by Karen Hamann (IFAU) *et al.*, published in October 2018.



**Table 4** Areas of concerns and mitigation strategies to reduce environmental impact about public procurement criteria for food and catering services

Areas of environmental concerns related to food and catering services	Examples of procurement criteria
Eutrophication, acidification and toxic impacts on human health and the environment due to the use of pesticides and fertilisers	<ul style="list-style-type: none"> <li>Organic food</li> <li>Food produced under Integrated Production Systems</li> <li>Sustainably-produced or caught aquaculture and marine products</li> </ul>
Animal cruelty due to a lack of respect for animal welfare	<ul style="list-style-type: none"> <li>Livestock products with high welfare standards</li> </ul>
Packaging waste	<ul style="list-style-type: none"> <li>In-bulk or in-packaging that has a high recyclable content</li> <li>Reusable cutlery, crockery, glassware and tablecloths</li> <li>Environmentally friendly paper (and tin and glass) products</li> </ul>
CO <sub>2</sub> and other pollutant emitted by the modes of transport used to carry out the catering services	<ul style="list-style-type: none"> <li>Improvement in transport routes and energy efficiency and emissions reductions of vehicles used to carry out the catering services</li> </ul>
Waste reduction	<ul style="list-style-type: none"> <li>Selective waste collection and staff training</li> </ul>
Other areas of environmental concerns	<ul style="list-style-type: none"> <li>Seasonal products</li> <li>Water and energy efficient kitchen appliances</li> </ul>

([http://ec.europa.eu/environment/gpp/pdf/toolkit/food\\_GPP\\_product\\_sheet.pdf](http://ec.europa.eu/environment/gpp/pdf/toolkit/food_GPP_product_sheet.pdf))

Producers intending to bid for public procurement contracts must present certifications attesting to their compliance with the necessary standard, such as for example – produced organically. The standards and certifications required by public procurers, therefore, play an essential role in shaping the food system, and especially production and demand in the Food Service Market.

As the Green Public Procurement system spans across goods and services, and Member States have different priorities in their policies for reducing environmental impact, and hence the importance of GPP criteria for food procurement may differ widely among the EU countries. In line with national (or regional) policies, the procurement authorities may have included food in the GPP. In such a case, when a call is drafted for tender by the public procurement authorities two sets of criteria are used to define the standard of goods and services requested. The criteria consist of a basic level (Core Criteria) and a more advanced level (Comprehensive Criteria). As for food and catering services, each level of criteria is defined as follows (European Commission, 2008).

- **Core GPP criteria** address the most significant environmental impacts and are designed to be used with minimum additional verification effort or cost increases. For food, these criteria



address organically produced food and packaging waste, while in Catering Services, they focus on organically produced food, waste minimisation and selective collection.

- **Comprehensive GPP criteria** are used by authorities seeking to purchase the **best environmental products available** on the market, and which may require additional administrative effort, or imply a specific cost increase compared to other products fulfilling the same function. For food, these criteria address more than merely organically produced food and products which ensure high animal welfare.<sup>4</sup> For Catering Services, the criteria also encourage optimising nutritional provision, and the use of recyclable paper products, including for kitchen utensils and environmentally friendly cleaning products.

GPP criteria must be verifiable and should be defined by Technical Specifications and Award Criteria as follows.

- **Technical Specifications** (TS) constitute the minimum compliance requirements that must be met by all tenders. They must be linked to the contract's subject matter (e.g. purchase of food) and not include any corporate practices, only characteristics specific to the product being procured. TSs are strictly pass/fail requirements in tenders;
- **Award Criteria** (AC) detail the desired performance. At the award stage, the contracting authority evaluates the quality of each tender and compares their costs. Contracts are awarded to the most economically competitive tender. The evaluation includes a cost element and a wide range of other factors that may influence the value of a tender such as environmental aspects. AC span the characteristics specific to the product being procured, which include its lifecycle and supply chain. The AC can be used to encourage additional environmental performance without being mandatory. In other words, products not reaching the required level of performance can still enter the market (Boyano *et al.*, 2017).

An example of a call for tender related to food purchasing and with the aim of reducing environmental impact is given in Table 5. It was specified at the beginning of the tendering process, by the procurement authority, the need for the food to be at least partially from organic sources.

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<sup>4</sup> Organic systems are legume-dependent as the essential nitrogen to drive production is produced by legumes (either directly or indirectly, by being passage through a farm-animal first).



**Table 5:** An example of a call for tender relating to the procurement of food produced organically

Technical Specifications	Verification Methods
X % of the food (defined as product groups like meat, dairy or vegetables, or a list of specific products, e.g. potatoes, tomatoes, beef, eggs etc.) must be organically produced according to Regulation no. 834/2007	Products carrying a Community or national organic label will be deemed to comply
Award criteria	Verification Methods
Organic food: additional share (more than X%) coming from organic sources above the minimum requirements in the specifications	Products carrying a Community or national organic label will be deemed to comply
Packaging – Percentage of products that <ul style="list-style-type: none"> <li>are supplied in secondary and/or transport packaging with more than 45 % recycled content;</li> <li>are supplied in packaging materials based on renewable raw materials;</li> <li>are not supplied in individual portions (single-unit packaging).</li> </ul>	The supplier must provide a signed declaration indicating which of these criteria are met. The contracting authority will verify compliance during the contract period, and appropriate penalties will be applied for non-compliance.

([http://ec.europa.eu/environment/gpp/pdf/toolkit/food\\_GPP\\_product\\_sheet.pdf](http://ec.europa.eu/environment/gpp/pdf/toolkit/food_GPP_product_sheet.pdf))

This example shows the criteria for organically produced food and the requirements regarding packaging, that had to be fulfilled by the prospective supplier and illustrates how additional environmental performance can be encouraged through public procurement procedures; thus indicating a transition path that encourages environmental considerations about food production.

#### 4.5. The Common Agriculture Policy

The Common Agriculture Policy (CAP) still dominates EU expenditure. The CAP has had a budget of around €400 billion for the period 2014-2020 (approximately 37% of total multiannual expenditures)<sup>5</sup>, while for the next planning period its proposed budget is slightly smaller, peaking at €365 billion.<sup>6</sup> This money mostly finances the European Agricultural Guarantee Fund (EAGF, ~77-78%) whilst the rest support the European Agricultural Fund for Rural Development (EAFRD, ~22-23%)<sup>5</sup>. The CAP is focused on stable food supply coupled with environmental protection and animal welfare, and other aspects (e.g. nutrition or health) are not incorporated (Kanter *et al.*, 2014). Cereal crops, which are high-yielding under high-inputs and intensive farming, get priority through policies which encourage inputs (subsidies, price interventions) and production (crop breeding/fertilisation practises). This global agri-food cultural policy cycle is completed by trade instruments (import quotas, tariffs, export incentives). The CAP incentivises export-driven food production activities that

<sup>5</sup> [EC communication new modern multiannual financial framework](#)

<sup>6</sup> [A Modern Budget for a Union that Protects, Empowers and Defends The Multiannual Financial Framework for 2021-2027](#)



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do not help realise different production, diets or small-scale farms which support local markets and short supply-chains. The result is a public investment into saturated fats and unhealthy diets, mostly *via* cereals and edible oils.

The importance of increasing the production of grain legume crops (e.g. Häusling, 2011) has been stressed for two specific reasons:

- The EU protein deficit (due to GATT, 1947; and, Blair House Agreement, 1992): urgently reducing the budget deficit requires lowering the EU's dependency on non-taxable soybean imports from the Americas. The primary driver of protein imports in Europe is the growth in poultry and pig meat consumption.
- Adverse environmental impacts of intensive cereal production: reversing such impacts would increase farm-level biodiversity and on-farm benefits through the regulating and supporting ecosystem services provided by legumes and associated good-practice.

Currently the CAP provides three different types of instruments to support legume production:

- 1) greening measures belonging to the 1<sup>st</sup> pillar and implemented through Ecological Focus Areas (EFAs);
- 2) Agri-Environmental-Climate measures (AECMs) as part of the 2<sup>nd</sup> pillar; and,
- 3) voluntary coupled support (VCS) which can be decided at Member State level to support sectors which undergo difficult situations (Table 6 for an overview of greening measures and VCS for the EU Member States).

**Table 6** Ecological Focus Areas (light green cells) and Voluntary Coupled Support (X) in the EU



Member States for the year 2019<sup>7</sup> (source: [EC COM, 2018, 757, p. 12](#))

Country	Pea	Faba bean	Chickpea	Lupine	Alfalfa	Soya bean	Oilseeds *	VCS (ha)
<b>Austria</b>								
<b>Belgium</b>								
<b>Bulgaria</b>	X	X	X	X	X	X		102,356
<b>Croatia</b>	X	X		X	X	X		70,000
<b>Cyprus</b>								
<b>Czech Republic</b>	X	X		X	X	X		134,000
<b>Germany</b>								
<b>Denmark</b>								
<b>Estonia</b>								
<b>Finland</b>	X	X		X				176,570
<b>France</b>	X	X			X	X		2,206,061
<b>Greece</b>	X	X	X	X	X	X		151,058
<b>Hungary</b>	X	X	X	X		X		261,070
<b>Ireland</b>	X	X		X				4,500
<b>Italy</b>	X	X	X	X		X	X	602,522
<b>Latvia</b>	X	X		X	X	X	X	38,449
<b>Lithuania</b>	X	X		X	X			101,400
<b>Luxembourg</b>	X	X	X	X	X			800
<b>Malta</b>								
<b>Netherlands</b>								
<b>Poland</b>	X	X	X	X	X	X		298,675
<b>Portugal</b>								
<b>Romania</b>					X	X		426,360
<b>Spain</b>	X	X	X	X	X	X	X	943,046
<b>Slovakia</b>	X	X				X		430,104
<b>Slovenia</b>								
<b>Sweden</b>								
<b>UK</b>								

\*(other than soy)

The direct payments – together with the measures to manage agricultural markets frequently called “the first pillar” – are the significant part of the CAP. To receive direct payments in full, conventional farmers must meet the Greening Requirements since the last reform of the CAP. If they do not, they lose up to 30% of the total Direct Payments for their farm. CAP Greening, within the framework of the 2014–2020 reform, conditions some support to rotation diversification (*i.e.* increase the range of

<sup>7</sup> Green cells indicate if a country allows farmers to fulfil the EFA obligations by cultivating certain nitrogen fixing crops on their farmland. Numbers are showed only for the VCS, indicating the number of hectares based upon the historical production area in 2009-2013. In Denmark, farmers are not allowed to fulfil the EFA obligations by cultivating nitrogen fixing crops, therefore no entry is showed for Denmark.



cropped species cultivated) and hopes to encourage absolute levels of legume production. One of the greening requirements is to declare at least 5% of the total land as ecological focus area (EFA). Beside others, there are also measures offered to keep these areas in production, like growing N-fixing plants (legumes). Since 2018, it is forbidden to use pesticides in those specific areas. While the cultivated area of legumes since the Greening of the CAP (2014) slightly increased, it was mainly through organic farmers increasing the proportion of legumes in their crop rotations. Only conventional farmers can initiate additional growth of the production area. In the EFAs a higher weighting factor of nitrogen-fixing crops (1:1 instead of 0.7:1) may further encourage farmers to grow more grain and forage legumes. For example, a legume-cereal intercrop can deliver monocrop level (cereal-only) yields, and it may be that up to 1/5 dose of (synthetic) nitrogen fertiliser is applied (as sulphate of ammonia as opposed to ammonium nitrate). However, Greening rules are usually interpreted to preclude any synthetic nitrogen use at all on legume crops. This does not encourage integrated low-input management (while safeguarding production), *i.e.* allow legume-supported areas to qualify for CAP too.

The EU's rural development policy (so-called second pillar) is funded through the European Agricultural Fund for Rural Development (EAFRD) from 2014-2020. There are 118 different rural development programmes (RDP) in the 28 Member States for this period, with 20 single national programmes and 8 Member States opting to have two or more (regional) programmes. Within their Rural Development programmes, the Member States can incentivise farmers to use legume crops in crop rotation or to maintain green cover improving the soil and water quality of agricultural areas.

Previous research on hindering- and enabling-policies contended that cross-cutting EU policies such as the CAP as currently implemented, are unlikely to reverse the trend of declining legume cultivation in Europe and would not be able to increase the production of protein crops significantly (Bues *et al.*, 2013; Topp *et al.*, 2014). Beside the already described policy measures to promote legume cultivation, production was forecasted to continue to fall due to technological lock-in. Crop yield levels and market prices were considered limiting the effectiveness of legume cultivation policy interventions. Magrini *et al.* (2016) showed that in France, the average gross margin for grain legumes is 2-6 times lower than major non-legume crops. In contrast, the unsustainability of the European agri-food system according to Annicchiarico (2017) may change by a drastic increase of legume cultivation in regions where its products will be consumed.

Policies for legume-based agri-food systems, such as area premiums, EFAs, incentives for increased pulse consumption, have had contested impact. Ongoing reliance on imported and genetically modified (GM) commodities such as soybean lead the supply of animal feed, and which is open to external trade disruption. One significant policy challenge is to avoid reliance on a small number of crucial (imported) commodities such as soybean. Also, as this approach encourages the continued over-simplification of cropping systems, upstream supply chains and equally polarised (meat-based) diets. In this context, cereal monocultures have a comparative advantage that would be difficult to erase. A policy that increases indigenous legume cultivation in Europe through price support would be strictly constrained by trade agreements in the World Trade Organisation (WTO) which facilitate imports through price reductions as well as the EU consensus on decoupled support systems.



#### 4.6. Trade policy

Agricultural trade, legume imports and access to EU markets are shaped by the WTO through rules on agriculture and food safety standard.<sup>8</sup> Similarly, the Transatlantic Trade and Investment Partnership (TTIP) has created regulatory convergence that impacts EU regulations on food. As a result, there is also a recent push towards more incentives for the substitution of imported soy by use of grain legumes from the EU.

Consumption of soybean in Europe rose from the equivalent of 2.7 million tonnes in 1960 to 43.5 million tonnes in 2016<sup>9</sup> followed by a decline to 37 million tonnes in 2018. More than 90% of this soya is imported from the USA and South America (Figure 2). Most of it fed to livestock. Thus, EU is highly dependent on soybean producing countries such as the US, Brazil, and Argentina. This jeopardises European food security since meat and dairy are principal components of the European diet.

In 1962, the American Soybean Association filed an Enforcement Action (Section 301<sup>10</sup>), of the Trade Act of 1974 alleging that the European Community (EC) oilseed subsidies nullified and impaired the previous trade concessions, specifically the tariff-binding agreed in 1962. In 1962, the USA negotiated a zero-level tariff-binding on oilseeds, oilseed products and non-grain feed ingredients imported into the EC. During the Uruguay Round of Multilateral Trade Negotiations (MTNs)<sup>11</sup>, two bilateral trade agreements were negotiated to remedy the oilseed dispute. These agreements were, the 'Blair House Agreement' and the '1992 Memorandum of Understanding on Oilseeds' addressed the oilseed trade dispute. Thus, a combination of EC policy reforms and trade agreements became the basis for resolution of the USA-EC oilseed trade dispute (Ames *et al.*, 1996). The USA accounts for 52% of imports of soybean to the EU, overtaking the volume supplied by Brazil. At President Trump's request, soybeans featured prominently in a plan for improving EU-US trade relations that were agreed on by the US president and the EU commission president Jean-Claude Juncker. Mr Juncker pledged in a White House deal in late July 2018 that Europeans would buy more U.S. soy as part of a package aimed at averting threatening tariffs from Washington on U.S. imports of EU cars.<sup>12</sup>

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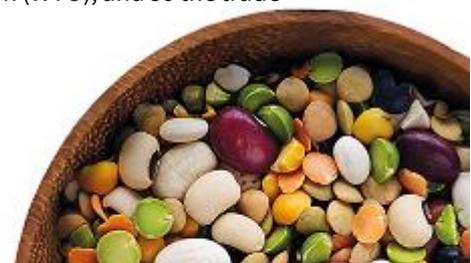
<sup>8</sup> According to the [WTO](#), production subsidies (*aka.* 'price support') lead to over-production and export subsidies, squeeze out imports and encourage low-priced dumping on world markets. In essence, only measures with minimal impact on trade can be used freely ("green box") - *e.g.* government services such as research, disease control, infrastructure and food security. Payments directly to farmers that do not stimulate production (direct income support, assistance to help farmers restructure agriculture, and direct payments under environmental and regional assistance programmes). Certain direct payments to farmers are also permitted where the farmers are required to limit production ("blue box"), as well as certain government assistance programmes that encourage agricultural and rural development in developing countries, and other support on a small scale ("*de minimis*") when compared with the total value of the product or products supported (5% or less in the case of developed countries and 10% or less for developing countries).

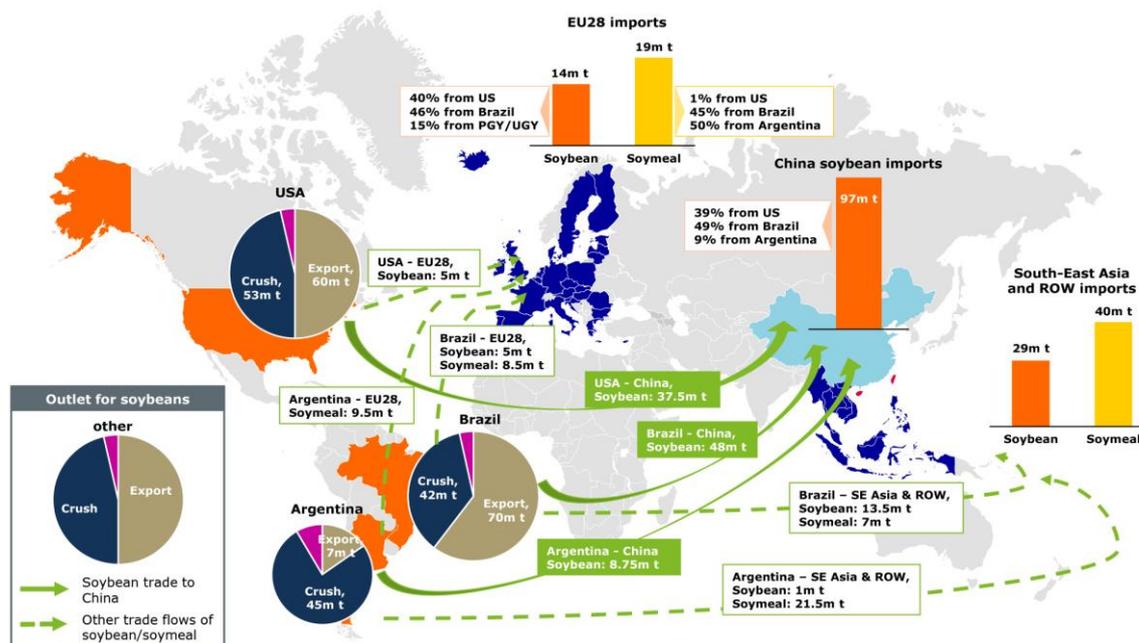
<sup>9</sup> [Donau Soja](#)

<sup>10</sup> Section 301 of the Trade Act (USA, 1974) is used to enforce trade agreements and open foreign markets to goods and services from the USA.

<sup>11</sup> The 'Uruguay Round', is the common term of the 8<sup>th</sup> MTNs which form part of the General Agreement on Tariffs and Trade (GATT) framework. This Uruguay Round spanned eight years from 1986 to 1994 and involved 123 countries. Pivotaly, this Round led to the creation of the World Trade Organisation (WTO), and so the trade rules the WTO embody.

<sup>12</sup> [US soy seizes EU market bolstering Trump trade deal \(Reuters\)](#)





Source: USDA, UN Comtrade, Rabobank 2018

**Figure 2** The global flows of soybean and soymeal trade<sup>13</sup>

Examples beyond Europe, e.g. the case of Argentina (c.f. section 5.1), Canada or India, underline the interlinked nature of trade policies on domestic-production, -processing capacities and -consumption patterns of legumes. Canada is one of the leading exporters of pulses worldwide. Legume-based rotations currently account for around over 20% of Canada’s arable crop rotation, partly due to the removal of agricultural subsidies in the mid-1990’s. However, many other factors have been suggested as drivers that encouraged the switch to legume supported production, including changes in trade policies. The recognition of a major global trade opportunity was encouraged by investments into industrial capacities for legumes through institutions such as [Pulse Canada](#), which is a union of four provincial grain legume grower’s associations, a processors and exporters (‘Special Crops’) association and the federal and provincial governments. Pulse Canada has been essential in developing production efficiency for large domestic markets, major international markets, and as providers of non-GM legume grains. Such investment is supported by a statutory levy for production of grain legumes (excluding soybean).

India is among the World’s largest producer and consumer of pulses, but at the same time the largest importer and accounts for half of the total pulses imported worldwide in 2016. Pulses are historically rooted in the Indian cropping and consumption patterns, partly due to cultural traditions of vegetarianism. In the last few decades, the growing population and increasing consumption exacerbated demand, turning India from a net exporter to one of the biggest importers of pulses. The import of pulses is conducted under the Open General Licence since 1979, with duty tariffs decreasing from 35% (1979) to 5% (mid-1990), and most recently to zero. To bridge the gap between domestic demand and supply, public sector trade bodies were pushed to enter the global pulses

<sup>13</sup> Source: [The severe implications of soybean tariffs](#)



market for procurement in 2007, the state covering 15% of their import bills *via* subsidies, and a public distribution system was established<sup>14</sup>. At the same time, export of pulses has been restricted, except Kabuli Chana and organic pulses and lentils at a certain quantity defined on an annual basis.<sup>15</sup> Despite all these efforts, the rise in prices could not be stopped, and food security (including sufficient protein intake) remains a challenge<sup>16</sup>.

#### 4.7. The European Plant Protein Strategy

The EC's Plant Protein Plan is built upon a resolution tabled initially in March 2011 called, "[\*The EU protein deficit: what solution for a long-standing problem\*](#)", and was considered in relation to the foundation established by the '[\*European Soya Declaration\*](#)'. On 17<sup>th</sup> July 2017, 13 EU countries signed the "European Soya Declaration", submitted by Germany and Hungary on the initiative of twelve businesses spanning grain traders, feed manufacturers and retailers<sup>17</sup>. The main aim of this Declaration, in the near term at least, was to mitigate Europe's growing dependence on imported protein, currently estimated at 70% of total consumption. These imports are mainly realised in the form of soybean, which are used to enrich cereal-based feeds for mostly pigs and poultry. Only 10-15% of legume grains produced in Europe are consumed by humans, despite their proven nutrition and health benefits. The development of Europe's plant protein plan is also related to parallel discussions on the future of the Common Agricultural Policy (CAP), and the desire to gain environmental benefits from more diverse rotations driven by the greater inclusion of protein crops, and especially the use of legumes<sup>18</sup>. A primary objective of the declaration is therefore to increase the production of legumes for human food and livestock feed as a contribution to the development of more sustainable and resilient agricultural systems in Europe<sup>19</sup>.

Soya grows well in many European countries with continental pedoclimates (Figure 3) and European soybean farmers and producers can grow high-quality GMO-free soybean. However, it should be noted that there was opposition to the Declaration as exemplified by the International Peasant's Movement, [\*La Via Campesina\*](#), who highlighted several risks of large-scale expansion of soybean cultivation in Europe and called for a social- and environmental-impact assessment of such large-scale intensification of a single crop of this nature.

<sup>14</sup> [\*Pulses trade flow to indian subcontinent\*](#)

<sup>15</sup> [\*Agricoop Pulses\*](#)

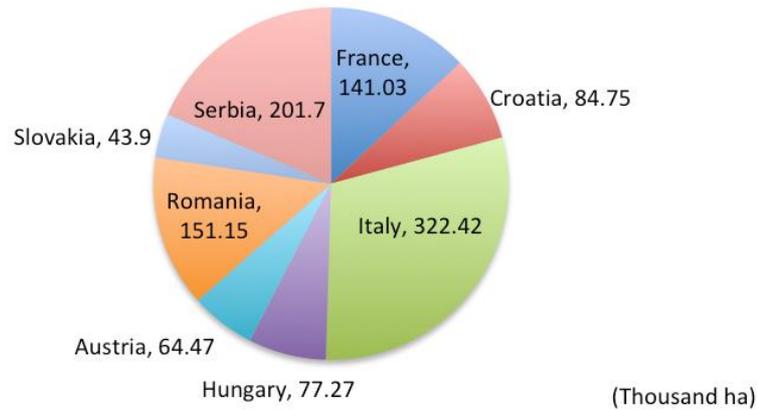
<sup>16</sup> [\*Food Security in India\*](#)

<sup>17</sup> [\*Brussels Soy Declaration\*](#)

<sup>18</sup> [\*The environmental Role of Protein Crops in the New Common Agricultural Policy\*](#)

<sup>19</sup> [\*Data Consilium Europa EU\*](#)





**Figure 3** Soy cultivation (thousand ha) in EU major producer countries (source: EUROSTAT)

The European Soya Declaration claims to support objectives of the UN SDGs 2030 and the Sustainable Development Strategy of the European Union<sup>20</sup>. With this Declaration, the signatory countries undertake to introduce measures for the growth of sustainable and non-GM soy crops, soy products and a transparent labelling system on certified production standards as proposed by Donau Soja and Europe Soya Guidelines. The 14 signatories further agreed to develop sustainable soybean, and other legume markets in Europe that balance and meet the needs of growers, processors, livestock producers and consumers along transparent value chains while providing consumers with information on moving to more healthy sustainable diets based on soybean protein.

In November 2018 in Austria, the European Commission launched a strategy for the promotion of protein crop production and processing in Europe. The publication ([Report of the Commission to the Council and the European Parliament on the development of plant proteins in the European Union](#)) was released after a public consultation phase and a series of meetings with invited experts specialising in innovations for the plant protein markets. According to the Report, results of the preparatory dialogues have highlighted claims that since the CAP reform in 2013, protein-crop areas and produced quantities increased considerably. Eurostat data show that the cultivated area for dry pulses and protein crops (including field peas, broad and field beans, sweet lupins, dry beans, other dry peas, lentils, chickling vetch, chick peas, vetches and other protein crops sown in pure crops or as mixtures with cereals harvested dry for grain) increased from 1.3 million hectares in 2013 to 2.6 million hectares in 2018, while production rose from 3.1 million tonnes to 6.2 million tonnes<sup>21</sup>. In the same period, cultivated area of soybean increased from 0.43 million hectares to 0.96 million hectares<sup>22</sup>, and production expanded from 1.2 million tonnes to 2.6 million tonnes<sup>23</sup>. However, it is difficult to find consistent data on the exact trends of average protein-crop areas and produced quantities<sup>24</sup>.

<sup>20</sup> [A European Union Strategy for Sustainable Development](#)

<sup>21</sup> [Dry pulses and protein crops for the production of grain \(including seed and mixtures of cereals and pulses\) by area, production and humidity \(Eurostat\)](#)

<sup>22</sup> [Rape, turnip rape, sunflower seeds and soya by area \(Eurostat\)](#)

<sup>23</sup> [EU Crops Market Observatory - Oilseeds and protein crops](#)

<sup>24</sup> Data gathering only extends to economic organisations above the economically viable farming criteria (measured in terms of the achievement of a specific income objectives),



The Report also states, that the compound feed market is the largest market for plant proteins, and soybean is the most preferred plant protein source. In the feed market, a potential rise of demand is expected for premium (non-GMO or organic) feed products. The food market is considerably smaller, although there is an increase in plant protein for human consumption in western and northern member states, which creates niches for innovation, product development and supply chain integration. The Plant Protein Strategy was published on 22<sup>nd</sup> November 2018 and points to five key policy areas for intervention, as summarised in Box 1.

“The report presents some existing policy instruments and new policy proposals which can contribute to realising the economic and environmental potential of protein plants in the EU. These include:

- Supporting farmers growing plant proteins *via* the proposed future CAP, by including them in national CAP strategic plans, in particular through rewarding the benefits of legumes for environment and climate objectives through eco-schemes and environmental/climate management commitments under rural development programmes; mobilising rural development support *e.g.* to stimulate investments and cooperation along the food chain; coupled income support;
- Boosting competitiveness through research & innovation from EU and Member States' research programmes and the doubling of the budget of the Horizon Europe programme for 2021-2027;
- Improving market analysis and transparency through better monitoring tools;
- Promoting the benefits of plant protein for nutrition, health, climate and environment with the support of the Commission's promotion programme, amounting to close to €200 million in 2019;
- Increased sharing of knowledge/best practice in supply chain management and sustainable agronomic practices through a dedicated online platform for example.”

*Excerpt from the [European Commission's press release IP/18/6495](#)*

**Box 1** Policy interventions recommended by the European Plant Protein Strategy

The Plant Protein Strategy was positively received by many actors, although concerns were also raised. For example, Copa and Cogeca, while welcoming the strategy, argue for further necessary policy changes, such as increased consistency of different EU policies, research and innovation targeting protein crops, more reliable contracts between crop producers and livestock farmers, increased support for protein crop producers under the CAP to secure farmers' income (as VCSs are considered only as a short-term solution), and a targeted policy for crop-based biofuels to rebalance the protein deficit, among others (GOL(18)585)<sup>25</sup>. The feedstock sector calls attention to the need of further research on the nutritional value of different protein crops and warns that the willingness to domestically meet European demand for protein rich feed might result in unfavourable changes of

whereas some legume production also occurs in farms below 1 hectare. Moreover, data on specific statistically measurable legumes are available, but it lacks the production in small-scale farms and genetic varieties stored in genebanks.

<sup>25</sup> [Commission reports on development of plant proteins in the EU](#)





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current land use.<sup>26</sup> Green NGOs, such as the Friends of the Earth<sup>27</sup> and WWF<sup>28</sup>, share social and environmental concerns over promoting soybean production in the EU, arguing that by increasing soybean production the unsustainable production structures (e.g. increased pesticide use, land grabbing, factory farming) will also be transferred to the EU. Instead, they advocate for a reduced level of production and consumption of animal products, and instead of promoting protein crops as animal feed, more emphasis should be placed on their human consumption and their environmental benefits.<sup>29</sup>

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<sup>26</sup> [\*The feed perspective for a successful EU Protein plan; Trade group advocates for feed perspective in EU proteinplan\*](#)

<sup>27</sup> [\*Soy Alert \(Friends of the Earth Europe\)\*](#)

<sup>28</sup> [\*Food consumert trends\*](#)

<sup>29</sup> [\*EU protein plan positive caveats\*](#)



## 5. Policies for legume-based systems from Europe and beyond

### 5.1. Germany: Policy instruments regulating the cultivation of legumes

Producing protein crops is incentivised in Germany by mainly various agricultural policies, implemented at the federal state and/or national level, and aligned with EU regulations. The *German Protein Crop Strategy* provides an overall national framework to tackle the decreasing proportion of legume production, whereas financial incentives are aligned with the CAP Greening Measures (Pillar I) and the Agri-Environment Measures (Pillar II).

Until 2009, the area of cultivated grain legumes decreased to between 80,000 – 100,000 hectares and stayed at this level until 2014. With the implementation of Measures mentioned above the area almost doubled by 2017, which is a success. 2018 was the first year when pesticides were entirely banned on Greening Ecological Focus Areas and despite early concerns the preliminary data show that the area sown with legumes did not decrease but actually continued to increase (Table 7).

**Table 7** Cultivation of grain legumes in Germany (in 1.000 ha) Development 2009 – 2017 compared to the mean from 2003 until 2008

Crop	Mean 03-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 <sup>4)</sup>
Field Beans	14.9	12.0	16.3	17.3	15.8	16.5	20.5	37.6	38.8	46.4	
Field Peas	95.9	48.3	57.2	55.8	44.8	37.9	41.7	79.1	87.5	85.5	
Sweet Lupins <sup>1)</sup>	33.0	19.4	24.0	21.5	17.9	17.4	21.4	29.8	28.6	29.0	
Soybean <sup>2)</sup>	1	2	4	5	6	8	10	17	15.8	19.1	
Others <sup>3)</sup>	4.5	3.3	3.2	2.9	3.6	2.9	8.8	13.9	16.4	17.2	
<b>Total</b>	<b>149</b>	<b>85</b>	<b>105</b>	<b>103</b>	<b>88</b>	<b>83</b>	<b>102</b>	<b>177</b>	<b>187</b>	<b>197</b>	<b>191<sup>4)</sup></b>

Source: Federal Statistical Office/Statistisches Bundesamt, BMEL (123). Comment: including seed production.

1) Bis 2009: Lupins. 2) Estimated by Sojaförderring until 2015, since 2016 statistically recorded. 3) Without soybean. 4) Preliminary figures of the Federal Statistical Office.

#### *Policy measures and strategies to support the cultivation of legumes in Germany*

##### **The German Protein Crop Strategy**

The German Protein-Crop-Strategy was developed by the Federal Ministry of Food and Agriculture (BMEL) and was first published in December 2012 to address the constant decline of legume cultivation and to expand the crop rotations in Germany and Europe for more sustainable agriculture. It is based on the critical issues identified by the legume forum of the German Alliance on Agricultural Research (DAFA 2012). The strategy aims to:



- reduce the competitive disadvantages of domestic protein crops (legumes such as broad beans, peas and lupins, as well as clover, alfalfa and vetch), fill research gaps, and test and implement the necessary measures in practice;
- strengthen both supply and demand for domestically produced legumes in conventional and organic farming;
- improve ecosystem services and resource conservation;
- strengthen regional value chains; and,
- increase the protein supply from domestic production and improve this supply through non-GMO protein crops.

Key aspects of the strategy are the legume-research and - demonstration projects which are positioned across the whole value chain, and the alignment of such innovation and the developments of the CAP measures. For implementing and coordinating the strategy, an office has been set up at the Federal Office for Agriculture and Food. The Protein Crop Strategy is funded with a total amount for implementation of €27 million from 2014 until 2020. (BMEL 2016)

#### ***Implementation of CAP direct payments and second pillar measures***

In Germany, all measures offered by the EU CAP first pillar to fulfil the EFA requirements can be used. After the measures “Intercropping” and “Fallow”, the third most important EFA type is “Growing N-fixing plants”. In 2017, on 174,000 hectares declared as EFA were sown with legumes (including forages) (BMEL 2016). For the second pillar, there is a national framework in Germany (*Joint Task for the Improvement of Agricultural Structures and Coastal Protection (GAK)*), where a range of measures offered by the EU are selected for implementation in Germany, and there is freedom to decide the way they are implemented. These measures are then realised *via* the EAFRD support programmes on the federal state level. For the support of legumes, the most important measure in this framework in Germany is called “Diverse Crops on Arable Land” and is based on the EU’s category agri-environmental and climate protection (Article 28 of the EAFRD Regulation).

Nine out of the 15 programmes of the federal states offer this measure (*Baden-Württemberg, Hamburg, Hesse, Mecklenburg-Vorpommern, North Rhine-Westphalia, Rhineland-Palatinate, Schleswig-Holstein, Thuringia*). Also, Bavaria offers the measure outside the GAK. Compared to the crop diversification objective of CAP Greening, this scheme requires a mandatory share of legumes and so gives a strong incentive to cultivate grain legumes in Germany.

To help implement that GAK Master Plan (2016), the Planning Committee for Agricultural Structure and Coastal Protection (PLANAK) has approved and defined the following payments for the agri-environmental and climate protection measures for "Diverse Crops on Arable Land" as follows.

- Cultivation of legumes or mixtures with legumes on at least 10 percent of arable land: 90 euros per hectare (€ / ha) of arable land and 55 € / ha of arable land for organic farms
- Cultivation of legumes or mixtures with legumes on at least 10 percent of arable land, if at least 5 percent of them are large-grained legumes: 100 € / ha arable land and 65 € / ha of arable land for organic farms
- Cultivation of large-grain legumes on at least 10 percent of arable land: 110 € / ha arable land and 75 € / ha of arable land for organic farms.



In each of the three cases presented above, if a conventional farmer declared a legume field as an EFA, he receives 20 € / ha less accordingly. Organic farms get a lower amount because they receive funding for farming organically, which automatically includes growing legumes – hence the support for organic farming favouring legume cultivation. The federal states can raise or lower these rates by up to 30 percent within their programmes (Table 8).

**Table 8.** Comparing the subsidies (€/ha) paid under the AECM “Diverse crops on arable land” scheme across in the different federal-state programmes for 2<sup>nd</sup> Pillar CAP measures.

Federal State (Bundesland)	10% legumes		5% legumes + 5% grain legumes		10% grain legumes		combined with EFA
	conv.	org.	conv.	org.	conv.	org.	
<b>GAK Master Plan</b>	90	55	100	65	110	75	each amount gets reduced by 20 €/ha if the area cultivated with legumes is declared as EFA
<b>Baden-Württemberg</b>	75	-	-	-	-	-	
<b>Hesse</b>	closed since 2015						
<b>Mecklenburg-Vorpommern</b>	65	40	75	50	85	60	
<b>Lower Saxony / Bremen</b>	closed since 2014						
<b>North Rhine-Westphalia</b>	90	65	-	-	125	90	
<b>Rhineland-Palatinate</b>	90	55	-	-	-	-	
<b>Saxony-Anhalt</b>	only contracts from the previous CAP-period						
<b>Schleswig-Holstein</b>	90	55	-	-	110	75	
<b>Thuringia</b>	90	55	-	-	-	-	
<b>Bayern</b>	funded only outside GAK/EAFRD						

### Knowledge transfer and research networks

Currently, there are three projects set up to promote the cultivation and use of legumes based on existing research results and identifying opportunities along the value chain. The three model demonstration networks cover soybeans, peas and broad beans as well as lupins. They are coordinated and implemented by the agricultural authorities in the federal states. Another network focussed on small-seeded feed legumes like clover and alfalfa is going to be set up in the framework of the federal programme for organic agriculture and other forms of sustainable agriculture (BMEL, 2017).





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**a) Soybean network (Soja-Netzwerk)**

The model demonstration network for soybean started in September 2013. On over 100 conventional and organic farms demonstration farms, current findings from soybean research are implemented in practice and data on soybean cultivation, and crop rotations are recorded. Events for farmers, extension providers and enterprises are carried out to ensure the exchange of knowledge (BMEL, 2016; Tschigg, 2017).

**b) Lupin network (Lupinen-Netzwerk)**

The model demonstration network for lupins started in October 2014. Around 50 conventional and organic farms from the northern part of Germany show best-practices of cultivating lupins. Data for economic evaluation and consequent findings on the ecosystem services are recorded on the farms. Model value chains with exemplary ideas for utilisation are developed and demonstrated for poultry, fattening pigs, in milk production, in seed production and the area of human nutrition (BMEL, 2016; Gefrom, 2017)

**c) Peas and beans network (DemoNetErBo)**

The model demonstration network on peas and beans started in spring 2016 to expand and improve the cultivation and processing of peas and beans in Germany through knowledge transfer between research, extension services and practice. Over 75 organic and conventional farms put into practice current research. Evaluations are carried out based on the production and economic data recorded on the farms. The network also develops, establishes and manages 50 model value chains in the areas of feed, ecosystem services and food (BMEL, 2016; Quendt 2017). Box 2 below summarises how the coordinator of DemoNetErBo perceives the current position of legumes in Germany.



*Which leguminous areas of your conventional farms have been declared as "Ecological Focus Area (EFA)" in the Greening or as "Diverse Crops on Arable Land" in the 2<sup>nd</sup> Pillar agri-environment-climate measures (AECM)?*

In 2016 the Demonstration Network for peas and beans in Germany (DemoNetErBo) worked with 45 conventional farms growing peas or beans. 25 farms declared it as EFA, 20 farms as AECM and 10 farms grew grain legumes (partly) without declaring the area as any measure. The total area of conventional grown field beans in the DemoNetErBo was 990 hectares at this point. 210 ha were declared as EFA, 355 ha as AECM and 425 ha were cultivated without any support. Conventional peas were grown on 920 ha, out of which 308 ha were declared as EFA, 449 ha as AECM and 163 ha were not declared. From this, it can be concluded that in the case of peas, the need for support was higher than for field beans. It is possible that this is related to the higher yields of field beans.

*How has legume cultivation as EFA changed after the ban on pesticide use?*

Due to the changes in the regulations, only 2 farms of the DemoNetErBo have dropped from the cultivation of grain legumes. Moreover, one of the two is now growing alfalfa grass. The cultivation of peas in Germany has declined relatively strongly, which probably reflects the greening changes. Because in Germany the total Area for nitrogen-fixing plants in EFAs declined from 174.205 ha in 2017 to 84.400 ha in 2018. A 50 % decrease. For the DemoNetErBo I have no exact numbers yet, but as I hear from the farmers, they are going to try out mechanical weed-control systems, especially on the EFA.

*What is the most important policy support under the CAP for the promotion of legumes at the moment?*

I think these are the AECM "Diverse Crops on Arable Land."

*In your opinion, is the political support of legumes sufficient?*

There are the federal protein strategy and various country initiatives. In addition to the model and demonstration projects, more and more R & D projects on legumes are being promoted. All together this brings new insights and keeps legumes in the communication, so that for a long time now a positive image is being conveyed. Also, there could be some kind of blending obligation for legumes in feed mixes. Alternatively, even better, that the "Diverse Crops on Arable Land" is extended to the entire cultivated area, with 10% legumes in the crop rotation will be planted a million hectares of legumes. This would provide 4 to 5 million tons of grain legumes per year. In addition, the diverse crop rotation also serves other aspects of sustainable agriculture. Increasing the price of nitrogen or levying a nitrate tax could also encourage the cultivation of legumes. Why should the taxpayer always pay twice, once for the cheap energy for N production and for the negative impacts of this and then again for the cultivation of legumes? That is absurd. In addition, a direct promotion of legume cultivation is not sustainable in my opinion, because more legumes are cultivated but sold off under the costs of production. I think there are more incentives needed that encourage processing and sales. Stimulating the demand for grain legumes can create true markets and increase the cultivation. A direct support of cultivation can only set the impulses, but after expiration of the support, it goes back again and again, as we have seen in the past.

*Who are the main players in influencing the political environment for the promotion of legume cultivation?*

I would put the question the other way round, who are the biggest brakes? There are many actors who do not want changes in the running system. As a strong supporter of legume cultivation, I see the UFOP. As a new measure, UFOP has set up a network of experts of protein plants. This is something new and could bring together all stakeholders along the supply chain of grain legumes.

**Box 2** Experiences with supporting mechanisms from farmers of the peas and beans network. Interview with Ulrich Quendt, Project Coordinator of the field peas and beans network (DemoNetErBo) in Germany



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### *Key players, market and policy processes incentivising farmers to produce soybean*

As a part of the case study of the University of Hohenheim on soybean production in Southwest Germany, 17 farmers were asked in a guided-interview about their motivation and reasons for soybean cultivation in 2017. The questions referred to their personal motivation and to actors, institutions or policies that influenced their decision to start and/or continue soybean cultivation. The questions did not address specific policies or institutions. Later, the results were grouped according to the answers. The results of these interviews are described as follows.

#### **a) *Influence from others on the decision to start soybean cultivation***

24% of the interviewed farmers named neighbouring farmers as a reason to have started cultivating soybean. For 41% the German Soja-Netzwerk was an essential influence for soybean cultivation; which is a demonstration network including research institutions, farmers and processors funded by the Federal Ministry of Food and Agriculture in order to improve the soybean chain/system. 24% indicated that the Agricultural Technology Center Augustenberg (an institution involved in applied research and knowledge transfer for agronomy funded by the Federal State) was an important source of information for soybean farming. 41% of all farmers identified different people who motivated them to cultivate soybeans (e.g. Regional Department of Agriculture, neighbours). 63% of the organic farmers stated Taifun Tofu GmbH (an organic tofu-producing company that has been sourcing local organic soybeans for many years and is a critical player in the Soja-Netzwerk) as the reason for their start in soybean cultivation.

#### **b) *Role of demand and prices***

53% of interviewed farmers stated that growing demand in their region and high product prices were the main incentives to take up soybean cultivation.

#### **c) *Policies***

While the use of pesticides was permitted on “greening areas,” 44% of interviewed conventional farmers cultivated soybeans in order to fulfil the “Greening Programme”, which in Germany recognises grain legumes as “ecological priority areas“. After the use of pesticides was prohibited in 2018, the farmers continued to grow soy but didn’t register the sites as part of the Greening Programme anymore. 44% of the interviewed conventional farmers received subsidies for soy cultivation as part of the “agri-environmental programmes” (diverse crop rotations and diverse cultures).

#### **d) *Perspectives for soybean farmers***

For 66% of the interviewed conventional farmers, it was vital to have more pesticides admitted for soybeans than are currently allowed. 55% noted that the prices for regional soybeans should not drop much lower than current levels to keep soybean production economically viable for their farms. A decline in soy price was only of concern for one of the organic farmers. 53% of all farmers stressed the importance of breeding for higher-yielding soybean varieties. 33% of the conventional farmers stated that they need more consistency in policies to be able to continue soybean cultivation.



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### *The Soybean Network: practical research to support policymaking in soybean farming*

The project establishing the Soybean Network was launched by the Federal Ministry of Food and Agriculture in September 2013 and ended in 2018. It is part of the “Protein-Plant-Strategy” of the Federal Ministry of Food and Agriculture and receives funding from the respective budget. The Soybean Network was founded with the aim to increase and improve soybean production and processing. 120 organic and conventional farms participated as demonstration and flagship farms to engage in knowledge transfer (e.g. farmer-to-farmer, field days with researchers and extension). Also, agronomic, economic and environmental data are collected on the farms. The farms are located in eleven federal states in Germany, with a strong focus on Bavaria and Baden-Württemberg, where soybean was already grown before the start of the network and where environmental conditions for soy cultivation are the most suitable in Germany. The flagship farms implemented new scientific findings on their farms and created different demonstration sites for innovative cultivation methods. Some farms provided field data for soybean, comparison crops and pre- and subsequent crops. The Soybean Network also targets the post-harvest and processing part of the soy food and feed chains for conventional and organic farming. A core feature of the soybean network is the knowledge transfer between research, agricultural extension and practical farming. This was implemented during the whole project period by farm visits, seminars and public presentations (Weier 2017).

Key partners in the Soybean Network include the following.

- **The Landesanstalt für Landwirtschaft (LfL)**, the “Bavarian State Research Centre for Agriculture,” is an institution for applied research funded by the Federal State of Bavaria and is the coordinator of the Soja-Netzwerk. It manages the data and coordinates the conventional Bavarian demonstration farms and offers seminars and field excursions.
- **The Landesvereinigung für den Ökologischen Landbau in Bayern e.V. (LVÖ)**, the State Association for organic farming in Bavaria, supervises the organic demonstration farms in Bavaria and helps to create a model value chain for organic soybean for fodder use.
- **The Landwirtschaftliches Technologiezentrum Augustenberg (LTZ)**, the Agricultural Technologie Center Augustenberg, supervises the demonstration farms in Baden-Württemberg and Rheinland-Pfalz, conducts field trials addressing different aspects of soybean cultivation, publishes cultivation guidelines and offers seminars and field days. LTZ is also in charge of creating a model value chain for conventional soybean for fodder use (Lfl 2018).



- **Taifun Tofu GmbH** is a tofu-producing company in Southwest Germany. Needing GMO-free, locally produced soybean, Taifun started cooperation for soybean production with local organic farmers in the Rhine region in the '90s. The company not only provides long-term contracts to farmers, ensuring stable soy prices, but the company is also dedicated to seed propagation and breeding. Together with the State Plant Breeding Institute of the University of Hohenheim, cold-tolerant varieties with high protein content, important for high tofu yield, are being developed. The cooperation between Taifun and the contract farmers also includes seminars about organic soybean cultivation, excursions to other soybean processors, annual meetings and extension services for the farmers. The farmers who produce for Taifun also create purchasing cooperatives to have cheaper access to production materials (Graf&Huber 2017).

### *Wider perspectives on policy options concerning the support of cultivation*

Most farmers interviewed perceived that they had gained a benefit from external institutions when they started soybean cultivation, thanks to the support of the *Soja-Netzwerk* and its affiliated institutions. All farmers said that they felt that they did not know enough about soy cultivation in the beginning. The *Soja-Netzwerk*, through its activities in **knowledge transfer**, was able to make the information needed by the farmers accessible to them. The LTZ, in particular, provided valuable information for the farmers because of its annual trials on different varieties and specific agronomic recommendations. The **interaction between farmers** is also significant, as many farmers started soy production after an exchange with their colleagues.

*Taifun* plays a major role for the organic soybean production in Southwest Germany. Many farmers cultivated soybeans for the first time because of the high prices *Taifun* was offering. This incentive, together with the promise of **stable prices and a secure purchase** was an important driver for many farmers. The success of this growing company should also be highlighted, with a continuous annual 12% growth in sales volume ten years after the foundation (Komus & Hoffman, 2018). In the meantime, soybean has become an important cash crop for dedicated organic farms.

The existence of a **local buyer for soybeans** is an essential prerequisite for the development of soy food and feed chains. The interviewed farmers stated that they were monitoring the price development for soybeans before they started to grow them for the first time. The high prices *Taifun* pays for high-quality soybeans are of especial importance for organic farmers. The conventional farmers also rely additionally on the governmental support from “Greening” and agri-environmental programmes.



The farmers interviewed and who participated in funding programmes explained that these **programmes reduced the financial risk when growing a new crop**. Because prices for regional conventional soybeans fluctuate considerably (Dorsch, 2012), soybean farmers started to need additional support from subsidies, claiming that they might otherwise quickly change to other crops and give up on soy cultivation. In contrast, reality showed that after pesticides were not allowed for “ecological priority areas” in the “Greening” programme. Hence from 2018 on, most farmers continued to grow soybeans. However, they did this outside of the greening programme to be able to **continue with chemical weed control** (Deter, 2017). As long as the prices for soybean stay interesting enough for the farmers, soybean cultivation might not be dependent on the “Greening” or other agro-environmental programmes.

For many conventional farmers the use of pesticides in soybeans is a prerequisite, but only a few pesticides are permitted (LTZ Augustenberg, 2017). **Insufficient weed control** is a reason for many new soybean farmers stop soy cultivation. This also explains their desire for **more consistency in regulations and policies**. The soybean farmers also put high hopes in the breeding of higher yielding varieties adapted to the local climate, since the breeding success of the past years allowed the soybean cultivation area to extend even to previously climatically unfavourable areas in Germany (Recknagel, 2014).

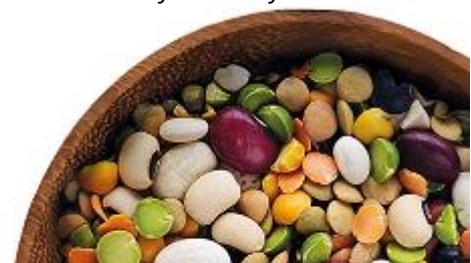
## 5.2. Italy: Environmental and policy analysis of soybean production

Italy is the largest producer of soybean in the European Union with more than 300,000 ha annually. Most of the soya produced in Italy is for animal feed, and only a small fraction is used for human consumption.

### Key players

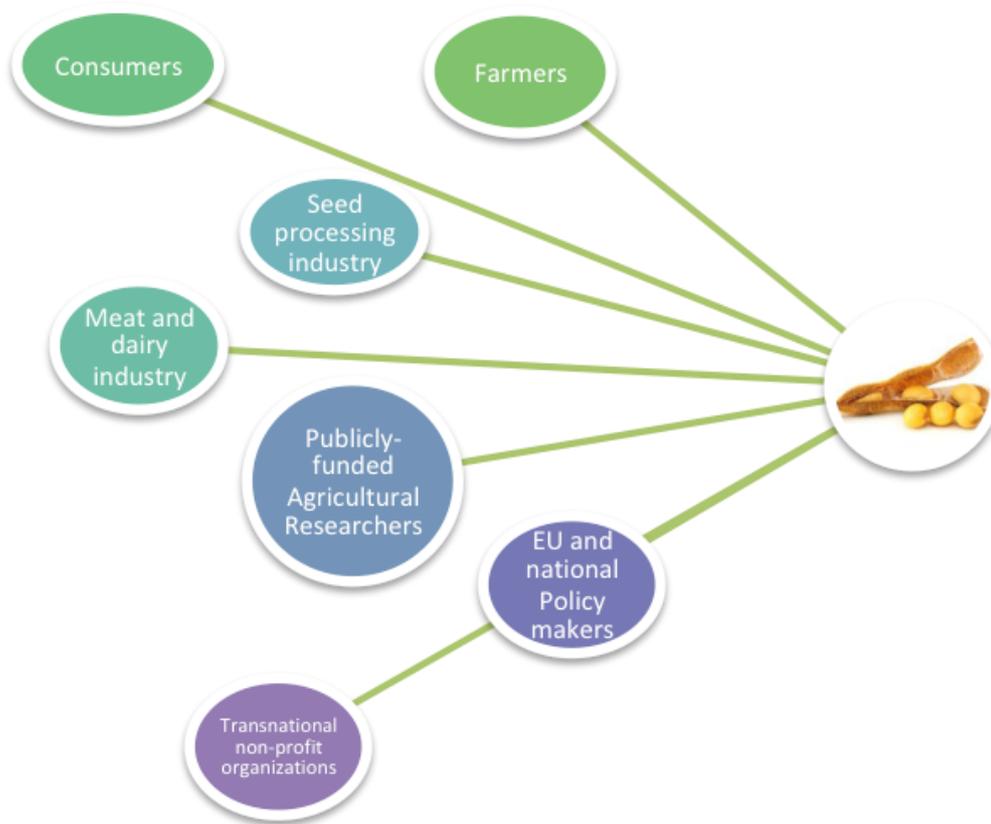
The primary stakeholders involved in soybean production in Italy are farmers, seed processing industry, meat and dairy industry, EU policymakers (CAP), consumers, and (government-funded) researchers (Figure 4). Consumers may not be included in the list of stakeholders, because the consumption of soybean as such represents only a small fraction of the soybean produced. Soybean for animal feed is an intermediary product while meat and dairy are the end product that reaches consumers. Most consumers may not be aware that claims of GMO-free meat and dairy could be unfounded in the majority of cases since the protein fed (soybean) to the animals in Europe are 90% of foreign (Brazil, Argentina, USA) origin and mostly GMO.

- Most **farmers** aim at increasing the profitability of soybean production by improving the efficiency of production and reducing costs to grow the crop. Soybean production would greatly benefit from an extended research plan where solutions to climate change-driven problems could be tackled in a structured way (responses of soybean to drought), where breeding programmes would bring new varieties to the market that can withstand the pressure of longer and drier summers in Northern Italy, and whose protein content and nutritional value for animal feed would be improved to meet the meat and dairy industry demand for high-quality product.



- Within the **processing industry**, [SIPCAM Italia](#), [Cereal Docks](#), and [Cortal](#) are the main actors in soybean processing. In particular, SIPCAM Italia provides extension services to the farmers supplying certified and selected seeds and supporting advanced technology-based pest, irrigation, and fertilisation management. In collaboration with Cortal, SIPCAM has funded in 2014 a non-profit organisation, SOIA Italia, to promote and support the development of the sustainable cultivation of quality soybean non-GMO in Northern Italy. Private partnerships of this kind provide most of the research and innovation background necessary to improve soybean cultivation in Italy.
- The fact that most of the **research** for genetic and agronomic improvement of soybean is carried out by private companies has been contested by the researchers that have been interviewed for this case study. The researchers are employed in government-funded agencies, which do not support structured research projects for soybean. Public agricultural research on soybean is strictly constrained in Italy by trade agreement in the WTO.
- Private companies are building **international networks** such as the Danube Soja Association to support an independent European supply of protein through a certification process that ensures sustainability of GMO-free production process of European quality soya. These types of transnational organisations claim to be non-profit organisations but do represent major large agri-businesses and so this charitable status must be questioned. Nevertheless, the organisation is emerging as a significant influencer for the expansion of production of non-GMO soybean of European origin. Italy has signed the EU Soy Declaration, but most Italian farmers have difficulties to abide by the strict standards imposed by the certification through Danube Soja.
- The Italian **meat and dairy industry** have a keen interest in GMO-free soybean of Italian/European origin to obtain an end product with higher market value. For example, in 2007, the [Parmigiano-Reggiano Cheese Consortium](#) decided to join the "GMO-Free Italy and Europe" campaign. According to Mr Alai, the consortium's president, the reason for choosing this policy lies in the consortium's commitment to protect the environment. Another reason, according to Alai is that "*we would not like to be blackmailed by exclusive suppliers of GMO-free soy imposing prices by leveraging their position of strength*". Thus, it will be necessary to check the possibility of signing agreements with the regions of South America, which can assure the supply of GMO-free products, and of starting studies and research to produce vegetable proteins within the production area of Parmigiano-Reggiano cheese, thereby strengthening even more its close tie to the land where the forage used is grown"<sup>4</sup>.





**Figure 4** Stakeholders with vested interests in soybean production in Italy

Thereby, Italian farmers have market incentives to produce soybean, which often becomes a substitute of corn, due to the many plant health issues associated with corn production. The CAP also represents an incentive to produce soybean in Europe. Soybean is an optimal crop for the improvement of soil quality and reduced synthetic fertiliser use (as a leguminous crop it fixes atmospheric nitrogen and increases soil quality), and it can be included in the rotation plan (spring-summer crop) thus breaking the usual short beet-wheat rotation typical of most Northern Italian large farms. In this respect, the introduction of soybean in the cultivation plan responds to the greening and crop diversification policy instruments of the CAP. Italian farmers benefit from these policy incentives as coupled payments.



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### *The history of soybean production in Italy*

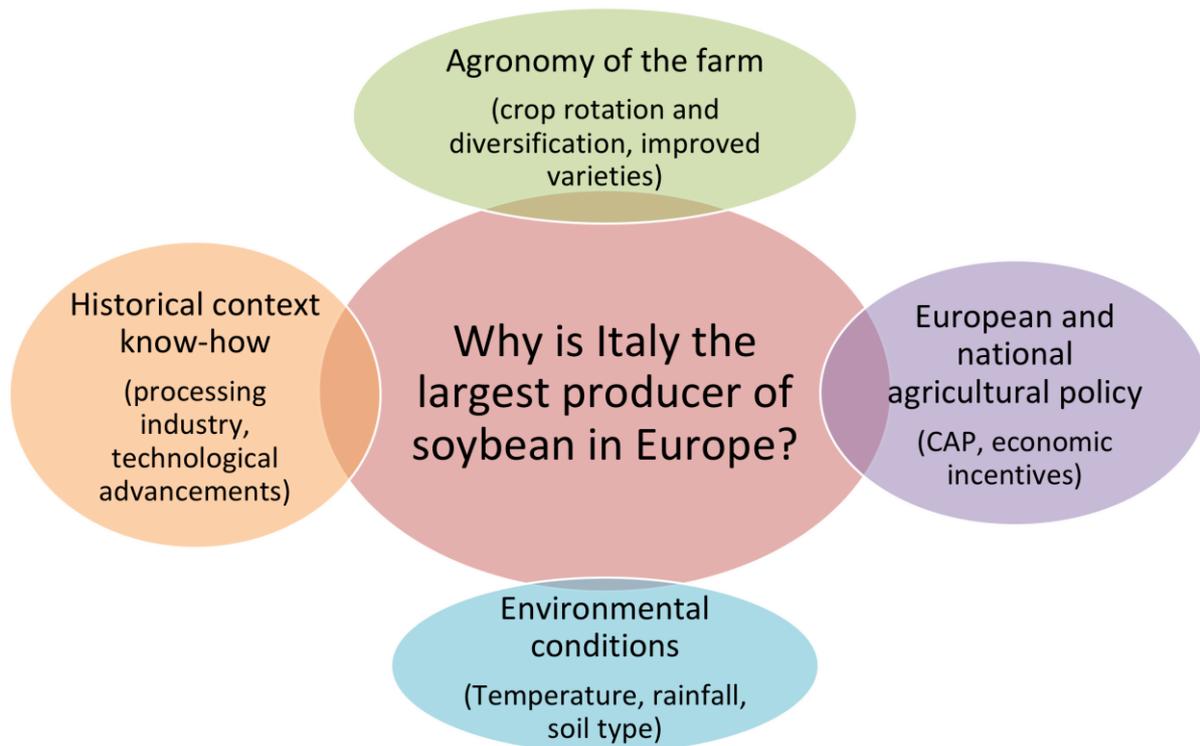
Large-scale soybean production began around 1980 in the North-Eastern part of Italy after the Ferruzzi agro-chemical industrial group purchased a large extension of land for cultivation of soybean in the Veneto and Friuli-Venezia Giulia regions. The Ferruzzi family is the founder of a business empire built on farming and the foodstuffs trade, chemicals, insurance and many other. The Ferruzzi group was one of the most influential traders of soybean in the world in the 80-90's and the family invested heavily in soybean production, not only in Italy but also in South America (Argentina). Since 1940, there had been many attempts to introduce soybean in Italy, but many of these attempts have been disappointing. The reasons were multiple, including soybean varieties not suitable for the environment, incompatible growing conditions, or expensive prices (Shurtleff & Aoyagi, 2015).

Moreover, the economic and agricultural situation in Italy at that time was not conducive to the introduction of new crops that would substitute the traditional crops (wheat, beets, and corn). However, in the early 80's a surplus of grains was being produced while European countries were becoming almost completely dependent on the import of plant-based protein products. These factors led to talks of promoting soybean cultivation in Italy, which was promptly financed and developed by the Ferruzzi group.

The main factors leading to the large-scale cultivation of soybean in Northern Italy is showed in Figure 5 and can be detailed as follows.

- Production costs for traditional crops were rising more quickly than the selling prices for their products and this spurred an increasing and urgent search by farmers for an alternative crop that could be included into the traditional rotation scheme and generate satisfactory revenues. The beet-wheat rotation had been used for a long time in most of the agricultural areas in Central and Northern Italy, while corn monoculture began showing the associated plant health problems. The lack of crop diversification caused the price of corn to fall. These agronomic factors led to increased production of soybean often substituting corn.
- Soybean has many agronomic advantages compared to corn, for example: it requires reduced use of plant health intervention and hence reduced costs of production, it fixes atmospheric nitrogen thus reducing the need to apply synthetic nitrogen fertilisers for the following crop, and it can be cultivated without irrigation in areas where precipitation occur in the spring and summer (*i.e.* Northern Italy).
- The presence of a well-established processing industry particularly interested in national soybean production. Soybean produced in Italy is non-GMO and thus particularly sought after by niche market producers such as the dairy industry in Italy (Parmigiano-Reggiano Cheese Consortium).





**Figure 5** Factors that have boosted soybean production in Italy

The alignment of these interests – the national economy, farmers’ needs, and the processing industry interests – created the conditions necessary for the testing, introduction, and popularisation of soybean in Italy.

*The policy content*

In Italy, there is no national policy to support and incentivise the production of soybean, or legumes more broadly. The central policy for which farmers receive economic incentives to grow soybean is within the remits of the EU CAP. Italian farmers in Northern Italy benefit from the coupled direct payments for oilseed that include soybean as a rotation crop. Crop diversification is one of the requirements for eligibility for the greening payment in the CAP Pillar 1. It must be said that for some, the crop diversification greening measure is a scandalous waste of resources<sup>30</sup>, as promoting improvements in soil organic matter (the main environmental objective of crop diversification) would be a more effective approach. Northern Italian farmers (relative to the South) receive the CAP coupled payments, most likely because of the pedoclimatic conditions that are more suitable for growing soybean (*i.e.* more abundant precipitation and less arid climate). Hence, soybean production is localised to the Po Valley in areas around Verona, Vicenza and Mestre.

<sup>30</sup> [Scrap the crop diversification greening requirement and find a sensible replacement \(CAP Reform\)](#)





The localisation of the production boosted a local flourishing processing industry that strongly supports R&D efforts as well as marketing strategies.

- One example is [SISTEMA GREEN®](#), a patented trademark by Cereal Docks. This method certifies the agricultural production chain system by guaranteeing the nationality of the product, the absence of GMOs and environmental sustainability claims by controlling greenhouse gas emissions. The main crops in this chain are soybeans, sunflower seeds, white corn, rapeseed and their derivatives. The certification covers aspects linked to economic, social and environmental sustainability and it guarantees the best possible traceability of the product by registering farms that adhere to the system into a 'Sustainability Website'. On the website it is possible to find information about producers and product information sheets, thus assuring transparency and the involvement of all stakeholders in the production chain.
- **SIPCAM1** is another important private industry that support soybean production. SIPCAM entered the market of soybean products in 2008 when it began distributing varieties of GMO-free soy and acquired the Ex-Monsanto processing facility in Lodi (Milano, Italy). SIPCAM's role in soybean production is to provide farmers with high-quality soybean seeds (and the necessary extension service) and connecting farmers with the processing industry. In other words, SIPCAM connects the dots of the production, distribution and processing of soybean by creating communication between these agents and providing the first link in the chain: the high-quality seeds. In 2014, SIPCAM Italia joined forces with Cortal Extrasoy, a processing industry of soybean into high dietary-efficient products and founded '[SOIA Italia](#)' a non-profit association for the promotion and development of sustainable cultivation of non-GMO quality soy in Northern Italy. SOIA Italia is involved in the provision of smart-farming technologies to support technological innovation in the cultivation and processing of protein plants<sup>31</sup>. The aim is to use decision support systems to automatically collect, organise, and interpret data and the information necessary to support agronomic decisions for betterment of soybean quality production in the EU. In addition, SIPCAM was the first in Italy to use "precision farming" to establish the correlation between soil characteristics and agronomic practices with the quality (content and type of protein) of the crop. All this means applying in soy production what is called the internet of things (IoT), that is the ability to collect and process information for an economic advantage. *"We believe that the IoT - states Piero Ciriani, director of the SIPCAM Italia seed business - has great potential in agriculture and the cultivation of soybean representing a competitive advantage for agricultural entrepreneurs. Using precision farming, we can detect thousands of data and information on the quantity and quality of crops linked to the characteristics of each plot, bringing the information and experiences normally obtained in research centres to farms. Thanks to these tools, we will be able to make this information easily usable by all farmers, helping them to make better use of agronomic products and techniques with the aim of harmonising production improvements and respect for the environment"*<sup>32</sup>.

<sup>31</sup> [Soya protein management \(iof2020\)](#)

<sup>32</sup> [Sipcam italia investe nella ricerca sulla soia \(italiafrui\)](#)



In summary, while Italian farmers obtain economic incentives for growing soybean from the CAP, research and extension service capacities are necessary to improve the private industry that provides the production of soybean. In Italy, research substitutes the absence of sufficient extension and agronomic service to help drive improvements *via* modern cultivation technologies and improved varieties. The government-funded research institutions struggle to provide this type of service. Agricultural advice is therefore offered by the private industries with consequences of downgrading low-input agroecologically-principled farms practices. The primary reason for this substitution appears to lie in the trade agreement sanctioned by the WTO.

### *Wider perspectives on the policy solution*

The shift in agricultural research from mostly public sector to an increasing share of private research is a phenomenon that has been observed across the globe. SIPCAM Italia claims that investment in soybean production aims at quality and sustainability from the economic, agronomic and environmental point of view. However, private firms prioritise research for which there is economic demand (*i.e.* developing technologies to enhance income of wealthier farmers, many of whom are also entrepreneurs with a broad income-portfolio). However, many crops are orphan-types (particular species and/or genotypes of local or regional importance), and in areas of the world dominated by poor smallholders. We observe that proportionally more agricultural research is privately funded, focusing primarily on already affluent sectors and individuals of industrialised countries.

Intellectual property rights laws are increasingly becoming essential for the food system, particularly regarding access, the widespread patenting of living organisms, and related 'biopiracy' (Pinstrup-Andersen & Watson, 2011). Without changing policy and institutions, the current and expected future technological revolutions may leave groups of the poor and food insecure as the equality-gap between rich and poor continues to increase. Poor farmers and consumers may benefit from the public-private partnership, but it is argued that these new sustainable business models need to become more widely used.

In this respect there are two initiatives, Donau Soja and Europe Soya, that aim to provide farmers with standard certification guideline for the sustainable production of soybean in the Danube region and Europe, respectively. These initiatives culminated in a collaborative effort, which includes food retailers, large agricultural traders, the animal feed industry, oil mills and numerous processors, as well as environmental organisations such as Greenpeace, Global 2000 and WWF. This broad membership base is essential to the protection of the environment and indirectly to support soybean production by smallholder farmers as well.

### 5.3. Croatia: Gaps in policies incentivising legume-based systems

In the Croatian context, legumes are mentioned in policy documents mainly in reference to the provisioning of animal feed and for the support of mixed farming systems. Despite the recognised and growing demand for protein crops in this sector, this is met almost entirely *via* legume grain (soybean) imports. Croatia currently does not have targeted policies for incentivising legume production or to improve the legume-knowledge base of farmers through the agriculture advisory



system, or extension services. Mechanisms shaping the agricultural systems have been analysed to identify leverage points for reviving Croatian legume production. To this end, we focused on the agricultural sector and the farm advisory system, as well as the policy documents influencing it. Looking from the production perspective, legume production is delivered by small family farms who grow grain legumes exclusively for their own on-farm use. Farms engaged in crop production, use legumes as one component of crop rotation and as a 'green nitrogen fertiliser' source. The farmers engaged in livestock production grow legumes for livestock feed. However, the intensity of legume cultivation is at a very low level. According to the data from the Croatian Central Bureau of Statistics and FAOSTAT, legumes occupy a share of 0.16 % UAA (Utilised Agricultural Area). In 2017, legume production occupied 2,580 ha of UAA. Considering legumes cultivated for human consumption: soybean, beans and peas are the main crops. For legumes cultivated as animal feed: alfalfa and clover forages plus soybean and pea grains are most commonly used.

### Background

In Croatia, three major policy documents regulate the knowledge transfer, consultancy and advisory services provided to farmers. The "*Law on Croatian Agricultural and Forestry Advisory Services*", describes how the *Croatian Farm Advisory Service* is constituted and what its main responsibilities are as a specialised public institution for performing consultation services in agriculture, forestry and fisheries. A key focus of the Advisory Service is to encourage farmers to engage in organic farming, and to promote sustainability through better management of soil and water resources. The "*Statute of the Croatian Agricultural and Forestry Advisory Services*", defines the legal founder of the Croatian Farm Advisory Service, its legal entity, the spectre of business, addresses of all branches in Croatia etc. The third document, which is related to the Farm Advisory Service, is the "*Strategic Plan of Work for Period 2018–2020*", in which seven main goals are specified regarding the education of and information provision to farmers, fishermen and foresters. One of these goals is, "*No. 1.4. Professional supervision of integrated farming*", which makes room for encouraging legume production in Croatia at the level of national legislation.

### Key players of advisory systems and agricultural policy in Croatia

All policies, guidelines and documents have the most direct impact on farmers as they are the primary target group of these policies. The most important regulations for them are regulations regarding soybean production and the desire to achieve more-sustainable crop rotations. The most important stakeholders in Croatia that regulate the mentioned policies are the Ministry of Agriculture and Agency for Paying's in Agriculture, Fisheries and Rural Development (APPRRR). In coordination with the Ministry of Agriculture, APPRRR conducts CAP measures and CFP measures that are financed through the state budget and EU funds. In response, farmers produce soybean - mostly because it has a stable price, which means that demand is bigger than supply. Legumes are also crucial in crop rotation as a source of biologically fixed nitrogen. This is generally recognised by low-income farmers who wish to offset input costs and safeguard soil qualities.

Regarding CAP Greening Measures that include payments for legume cultivation; the Ministry of Agriculture is the 'Competent Authority', which embodies an 'Agency for Paying' (the CAP) and this Agency is supported by the national Advisory Service who advises producers on how to meet the



practice and administrative requirements regarding implementation of their CAP applications and registrations. Currently, there is a lack of knowledge sources related to legume production. The Agricultural College also teaches their students over a semester on agroecological practices including: biological soil fertility, natural nutrient cycling, mineralisation of soil organic residues and processes that have a positive effect on soil organisms. If we observe the level and availability of knowledge sources at a national level, it can be easily concluded that there is a lack of legume-based knowledge. Legumes are crops that appear unimportant and get very little attention for agricultural production in Croatia.

### *The evolution of the farm advisory system*

The ‘National Farm Advisory Service’ was established in 1994 by decree of the Croatian Government. In 2010, the Farm Advisory Service was part of the Croatian Chamber of Agriculture, but due to various operational reasons, the Farm Advisory Service was dislocated from the Chamber. In 2012, the Law on Croatian Agricultural Advisory Service was launched, and in 2013 new amendments to the Law were adopted. One of the most significant changes in the amendments was that employees of the Forestry Advisory Service joined the Farm Advisory Service. The most recent changes were issued in February 2018, when the Croatian Government decided to merge the Forestry Advisory Service and the Farm Advisory Service to operate together under one name, the ‘Croatian Agricultural and Forestry Advisory Service’. These amendments were discussed and commented on on national websites, where mainly stakeholders from the forestry sector and universities actively took part in the discussion. Regarding the *Statute of the Croatian agricultural and forestry advisory services*, there were no significant changes issued over time. Changes in the Statute was aligned with the changes mentioned above in the Law.

The activities carried out by the Croatian Farm Advisory Service has been outlined in strategic plans, renewed every three years. The first *Strategic plan for 2015-2017*, before Croatia entered the EU, describes how the Farm Advisory Service was established, and defined seven main objectives for the period: 1, increasing farm competitiveness; 2, efficient use of national and EU funds; 3, supervising integrated production; 4, professional education for farmers, fishermen and forest owners; 5, conducting the annual FADN research; 6, record-keeping for forest owners; and 7, planning and administration of procurement for works in the management of private forests owners. Analysing these objectives in detail, more emphasis on forest management than on agricultural production is clearly given. However, the *Strategic plan for 2016-2018* (post EU membership), had a similar structure and content, although the strategic goals were different. This time more attention was paid to sustainable management in agriculture: a new goal was added, “to achieve sustainable use of pesticides”, and one goal targeting forest owners (record keeping for forest owners) was removed. The *Strategic plan for period 2018-2020* follows the similar goals to the 2016-18 plan.

A “*technological instruction for integrated production of field crops*”, has also been adopted and it describes how integrated production as a low-input and more natural means to implement pest-control can be practiced whilst safe-guarding soil qualities and biodiversity. The first accessible online version of these instructions dates back to 2012, but since then the instructions are regularly updated. For example, in 2013 the new Instructions emphasised the importance of holistic crop rotation, where legumes have a significant role together with cereals and clover blends



(intercropping). The last edition of the, ‘*Technological instruction for integrated production of field crops*’ was published in 2014, following a similar structure and applying the same instructions as the previous document, although attention was extended to overcoming practical challenges of legume production and recommended effective ways of protecting legumes (especially soybean) from diseases and pests.

The national Laws and strategic documents regarding Croatian agricultural and forestry advisory service are not expounded in news or social-media sources. Therefore, public opinions on the effectiveness of these policies is difficult to gauge. Thus, any Ministry of Agriculture guidelines and policies, whether old or new, are used mainly by Government funded agricultural advisors and extension services, and it is generally these agencies which recommend implementation advice to farmers and other stakeholders.

### *Policy gaps and leverage points for incentivising legume production*

A central conclusion of the above analysis, including the assessment of policy documents and a key informant interview, is that: in Croatia there is no legislation or measures that directly encourage legume production through knowledge transfer and farmers Advisory Service. Nevertheless, the “*Technological instructions for integrated production of field crops*” – the document issued by the Ministry of Agriculture – influences legume production indirectly by outlining advice on integrated agricultural practice. Some objectives of the instructions are easier to achieve if legume production is integrated into agricultural land use, such as reducing soil, water and air pollution, or conserving the environment and natural habitats. A key goal of the instructions is to encourage soil fertility by promoting crop diversification. Therefore, the guidelines clearly describe the minimum area of arable field crops to be included in the Croatian Register of Integrated Production and recommend crop rotation as a useful and necessary measure for integrated production. When consulting, representatives of the Advisory Service must mention to farmers that crop rotation is one of the most critical parts of integrated farming. This is an important option for promoting legumes, because farmers who want to be part of the *Register of Integrated Production* must include legumes in crop rotation: that is, legume production is mandatory for them. Farmer advisors can draw upon several practical examples of effective crop rotation and management options that include legumes, to provide farmers with expert knowledge on how to consistently deliver a well-balanced mix of soil nutrients necessary for good crop production.

The roles and responsibilities of the Croatian Agricultural and Forestry Advisory Service – as defined by the Law – include technical inspection of integrated and organic production, but there are no activities or indicators directly connected with legumes. Encouraging legume production through the Advisory Service is linked to broader arguments or more general policy measures such as perceived sustainability, the necessary breadth of different crop types to constitute a rotation, and compliance with CAP Greening Measures. For instance, there is obligatory education for all farmers who want to receive CAP payments for provision of IACS measures. As the implementer of national agriculture policies, the Advisory Service also organises courses for farmers to ensure the safe handling and proper use of pesticides. Another learning opportunity for farmers, which is more directly linked to the benefits of legume production, is training regarding soil fertility building as a prerequisite of stable field crop production. Only through these kinds of workshops can the farmer’s



advisory system reach out to producers and promote the incorporation of legumes in the production system.

As mentioned, the main problem currently is the lack of policies that regulate the situation and encourage legume production and consumption, or uptake by the upstream supply-chain, including by consumers. This is confirmed by interview with agricultural Advisory Service representatives, who said that there is no significant frameworks or goals in our agricultural policies regarding legumes, because in Croatia legumes are only important for animal feed (soy primarily) and crop rotation. Croatia has not yet developed the awareness and importance of legumes in human nutrition so that the policy gap could be considered as ‘normal’.

### *Wider perspectives on the policy solution*

For all information, measures and policies that are active in Croatia, the most significant target audience are the farmers, but as already mentioned, existing measures for them are important only for getting CAP for implementing Greening Measures, more-diverse crop rotations and on-farm provision of animal-feed. The nutritional value of legumes for the human diet is not mentioned in any national strategic plan. Despite this, recently a “School Scheme” was launched to help ensure that children eating in school canteens receive one meal *per* day which includes fruits. In the next period it is possible that a “Legume Scheme” could be introduced as well, which could target end consumers and promote the inclusion of legume protein sources in the menus for at least two days of the school-week.

In Croatia, legumes are mentioned only in animal feed context, and current policies support legume production only through selected mechanisms, usually related to CAP and including implementation of Ecological Focus Areas (EFAs) and agri-environment programmes. Likewise, through integrated farming, legumes are presented as crops that are high in protein, and very important for the delivery of holistic or restorative crop rotations. However, as currently pursued these guidelines are not expected to result in significant changes in cropping patterns, or increased legume inclusion, and therefore will fail to realise more sustainable production and consumption. We should not overlook the reality that Croatia does not yet have a sustainable plant protein policy despite the high demand for such commodities (leguminous) from the livestock sector - to meet society’s increasing demand for meat. Our assessment shows that sustainable economic development in Croatia urgently requires more effective and broader policies than those that currently exist. The new policies should be ‘agri-food’ (and agri-feed) focused. That is, they must target the whole supply-chain, since this approach recognises the importance of the supply (production) and demand (consumers/end-users) elements which are necessary to collectively increase the uptake of home-grown legumes.

### 5.4. Denmark: Policies on food procurement to incentivise legume consumption<sup>3</sup>

It is the aim of the Danish government that by 2020, 60 % of public procured food should be labelled as organic<sup>33</sup>. To drive the implementation of this regulation, the scheme “[Organic Eating Label](#)” was

<sup>33</sup> [Pure au Denmark DCA Report](#)



developed in 2009 to leverage demand for organic food in public food service entities and for promoting communication with consumers. Since then, the adoption of the scheme has become much more widespread. In 2018 more than 2,550 entities in public and private food service adhered to the *Organic Eating Label*, that is nearly half of the business serving the Greater Copenhagen area. The *Organic Eating Label* comes in a Gold version (90 % of procured ingredients are organic); in a Silver version (60-90 % of procured ingredients are organic), and a Bronze version (30-60 % of procured ingredients are organic) (Figure 6). The award does not discriminate whether the organic products are processed or not, or whether they are of Danish or foreign origin. The label is valid for food and drink and the Danish Food and Veterinary Authority monitors the awarded entities to ensure compliance with the regulations.



**Figure 6** The Organic Eating Label in Gold, Silver and Bronze

### Background

The *Organic Eating Label* 's primary objective is that public and private food services use organic products and to communicate this to consumers. Thus, the Label has an overarching marketing and communication purpose. The label can be considered as a tool for consumer communication as the label the provider uses organic products. In this way, consumers can actively choose to go to outlets which informed consumers that they have been awarded this label.

As food service entities turn to buy more organic ingredients, costs for the food increase as organic food is more expensive than conventional products. Public kitchens have experienced this in for example hospitals and private kitchens, canteens and restaurants. In order to avoid financial difficulties, the kitchens in public and private food service have switched to preparing more-seasonal menus, using more unprocessed products (e.g. fresh produce and whole meat cuts), to prepare more vegetarian dishes. The change in menus has stimulated demand for pulses, and in-season fresh-peas and -beans.

### Key stakeholders

The most important stakeholders for the *Organic Eating Label* are: 1, food service providers in public and private food service (the scheme is intended for these actors); 2, processors and wholesalers as these groups provide the organic products to the kitchens; 3, consumers as the target of the label's communication; 4, public authorities as they monitor the compliance for the label; and 5, farmers that produce to food processors and wholesalers.





### *The evolution and the impact of the policy solution*

In Denmark, the ‘*Organic Eating Label*’ has increased demand for basic organic-based commodities such as dairy products, onions, potatoes, cereals and eggs, and led preparation of ‘homemade’ and ‘in-season’ food from basic ingredients. This has also resulted in new recipes based on seasonal produce being created, which features new ingredients (for this region) in dishes. Dried-beans, -lentils and -chickpeas have earned a more profound role in Danish cuisine as the public food service entities adhere to the *Organic Eating Label* – that is, this scheme promotes the use of fresh, dried and processed pulses. By their nature, organic systems and the produce they yield are leguminous or legume-supported. Implementation of the *Organic Eating Label* has also promoted the success of organic farming in Denmark which includes organic dairy products derived from clover-grass (not imported-grain) fed ruminants. It is evident that a scheme like the *Organic Eating Label* has increased organic legumes use of human (and animal) nutrition and improved the profitability of organic farm-based enterprises - as well as encouraging the possible environmental and human-nutritional benefits that emerge from the greater and proper cultivation and consumption of legumes.

### *Wider perspectives on policy options concerning food procurement*

Neither “legumes” nor “legume-based products” are represented in the procurement system as a specific category. Instead, they are buried within product categories such as frozen food, frozen vegetables, canned food, processed food, grains and flour, or horticultural products. The establishment of a product category named “legumes” and or “legume-based products” must be considered as a priority as it is likely to prove beneficial to encourage the procurement of these products. The EU’s Green Public Procurement initiative encourages consideration of environmentally sustainable consumption in public procurement contracts, and legumes present a key product in this respect. The development of this new category would reduce the environmental impact of food production, but its instigation needs to be discussed and developed at regional and national levels to ensure fair but effective commercial competitiveness. This may indicate that realising thresholds and underpinning policy and financial supports for “legume and legume-based” food category or categories may be necessary. This is presented here as a long-term vision.

Procurement criteria in the food service sector are firstly defined by prices, followed by a range of other criteria such as quality, freshness, local, ease of use and certification. The term “*quality*” is mentioned by procurement personnel, but not defined in detail. This could indicate a need to design a “*quality scale*” for legumes and legume-based products that could define (in order of their likely significance to the average consumer): organoleptic- > nutritional- > sustainability-parameters. The options must of course be accessible and affordable too.

Growers and other food companies willing to engage in the (local) food service market and supply chains need to possess the required certificates, particularly in relation to food safety requirements. Other certifications related to other aspects of ‘quality’ include production method, nutrition and provenance and can be used in policy-making and marketing strategies, which are geared to shape market demand. There is no consensus among food service entities regarding the definition of ‘*sustainability*’ and associated with the word are identified proxies such as ‘*reducing food waste*’.



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and ‘food miles’, using “recyclable packaging”, “greening-menus”, “healthy-option” menus and “local food” including commodities from “community” projects. Further research and testing activities involving food service actors are needed to clarify how “sustainability” can be operationalised or implemented to ensure legumes and legume-based products are fully recognised and acknowledged in the food supply chains and foodservice market.

### 5.5. Portugal: Public policies to promote legume consumption in schools and other public institutions

Eurest-Portugal continuously carries out an analysis of the legislation that could affect their service and models the options of their consumers in a continuous way. In addition, Eurest associates with partners in the areas of healthy and sustainable food, promoting options that are best suited to the well-being of consumers and the planet. Based on this, three, relatively recent documents that have a significant influence on the introduction and promotion of the consumption of legumes in the school population and other public institutions were reviewed.

#### Background

*"Circular 3/2013: Orientações sobre mental e refeitórios escolares" (Guidelines on menus and school cafeterias) and New update to this document (made public in July 2018)*

School cafeterias are a privileged place of health education, promoting healthy lifestyles and social equity, as it provides nutritionally balanced, healthy and safe meals for all students, regardless of the socio-economic status of their families.

The directors of the educational establishments are responsible in ensuring the access of all students to healthy and balanced meals. This circular and its annexes contain guidelines on how to design menus in school cafeterias (either in the cafeterias of direct management or in the cafeterias leased to catering companies according to the public procurement procedure). Detailed information on authorised foods, the composition of meals, including respective quantities to be used and the seasonal availability of products are clearly presented in this document. For instance, the composition of the menus is clearly defined considering legumes as daily alternatives to the base of soup and an accompaniment of the main course.

With the aim of ensuring quality and a varied diet, the menus follow the instructions outlined in the document, in terms of the preparation, presentation and frequency of supply of specific food products. The guidelines provided on the frequency of the food products featuring on the menus has contributed to the increase of more healthy options and the introduction of a mandatory minimum regarding balanced and healthy alternatives such as legumes. In dishes in which legumes are included, there is a recommendation to reduce the amount of meat/fish, as a result of the protein contribution of legumes.

The new update, made publicly available late in July 2018, has reinforced the importance of healthy alternatives using legumes (vegetarian menus), the gastronomic traditions of the Mediterranean



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diet, the environmental impact of food products and the small ecological footprint of legumes as a source of protein.

*Lei 11/ 2017: Estabelece a obrigatoriedade de existência de opção vegetariana nas ementas das cantinas e refeitórios públicos (Establishes the mandatory existence of a vegetarian option in the menus of canteens and public cafeterias)*

This law resulted from the growing awareness of the increasing number of customers with specific dietary requirements such as being vegetarian or having special personal health related needs. The law applies to canteens and cafeterias of independent organisations as well as of the authorities and bodies of public administration but could easily extend to other private clients. The law itself does not make direct references to the promotion of legume consumption, but as the alternatives for vegetarian foods are often the vegetable protein contained in legumes, it has a strong indirect influence on legume consumption. For instance, following the national gastronomic traditions, reintroducing traditional recipes is seen as a positive response to the new requirement to provide daily vegetarian dishes with products that are easy to cook and at an acceptable cost.

This document clearly defines that vegetarian menus must be planned under the guidance of technicians and considers the composition of meals, ensuring diversity and availability of nutrients that provide a healthy diet. Involving the experts in the field of food, e.g. nutritionists, who are long defenders of legumes as an alternative source of protein supply.

Both documents mentioned above are mandatory implementation procedures in public agencies, being common to the application in private organisations. Although they do not target directly or exclusively the promotion of legume, they still brought an increase in the consumption of legumes at the national level, resulting from the more frequent introduction of these products in the menus or side dishes of meat/fish, soups and vegetarian regimes.

### Key players

- The **General Educational Direction** (Direção Geral de Educação) has published the Circular 3/2013 and its New update, considering that the application of these guidelines will be aimed at promoting healthy eating habits as well as the educational success of students, seeking to promote healthy eating habits and a stronger environmental awareness in the younger population.
- The information available in these guidance documents was drawn up by a **multidisciplinary** team consisting of professionals of education, nutrition and management, and was supported with information from the **General Health Direction** (Direção General de Saúde) and with evidence collected by various interveners that analysed the food options available in schools nationally. These studies also evaluated the nutritional state of the students, which included investigations conducted by various institutions in the area of health and nutrition such as the Faculty of Science of Food and Nutrition at the University of Porto (FCNAUP), Catholic University School of Biotechnology (UCP), Order of



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Nutritionists (ON), etc. These documents are constantly updated in line with the most up-to-date information and knowledge.

- The availability of vegetarian alternatives became a major requirement for some **consumers**, whose number has become sufficiently large for the need for a common provision to be recognised by schools and other partners, such as **parents' associations** and other entities related to public health and education. The law 11/2017 was in general well received by consumers and is considered important for the vegetarian and vegan communities, which are increasing in Portugal (and not always in a nutritionally well-balanced fashion). The intense focus on legumes as a meat-alternative requires clarification. In recent time the legume-processing industry invested in the marketing of legume-based products as “meat alternatives”, to appeal to the dominant food-culture and consumer expectations. In many cases, a dish contains legumes as either a protein source, or a simple accompaniment to the main meat or fish component of a meal. Some of the guidelines laid down in the documents caused a few problems as children struggled to accept some of the meals. In some cases, families had lost their habits and gastronomic traditions which resulted in the children rejecting the new foods, due to the unfamiliarity with the commodity it was based, or/and were not accustomed to eating them in those kinds of recipes. For example, meals with a high level of rejection include legume-soups or sauces where the legume grains were not presented in a pureed form.
- With positive opinions of organisations related to food and nutrition, vegetarian alternatives have become a clear option, which has been supported by the General Health Direction (DGS) and General Health Educational (DGE), and other **public bodies**, who implemented this alternative immediately at the level of the offer in cafeterias of public administration. Health and education organisations responsible for the management of this process continues their efforts to overcome the technical difficulties and reinforce the social intervention in order to improve the knowledge of the population and strengthen the importance of acquiring healthy eating habits early in life.
- The introduction of "Circular 3/2013: Guidelines on menus and school cafeterias " contributed with more accuracy and to some extent to some equality regarding the provision of school meals by **various suppliers** (catering companies or local). The practical application of these rules is not always easy for all players. On one hand consumers should understand and accept the ingredients being considered in the preparation of best school menus. On the other hand, health authorities supporting these guidelines act on the assumption that the public is already knowledgeable on what constitutes healthy food choices. Given that the provision of school meals is largely defined on the basis of lowest price and that school kitchens often lack ideal conditions regarding expertise and equipment, the guidelines defined in the “Circular are 3” could not be applied to the same extent in all schools. Regarding the food providers/companies, the focus remains on improving the conditions of the contracts and promoting public investment in the recovery of the kitchen facilities in the institutions (schools, hospitals, businesses and various places where meals are produced).





- **Eurest** has consistently invested in the promotion of healthy foods following the national traditions of Portuguese cuisine. Legumes remain a long-term project for the company on the basis of their nutritional value, their economic competitiveness and commercial potential in addition to their (potentially) high environmental credential. Eurest and its technical staff have operated in a fully-collaborative manner with all its business partners and organisations in the health and education sectors to promote alternatives that improve food choices. Such efforts are targeted mainly at consumers in their early years, in schools but also in the hospital and social-care facilities, companies and factories. They have been following the growing positive impact of increased consumption of legumes. Their data show an increased purchase on legume-based products in recent years, which reflects the investment in increasing consumer awareness of the benefits of legume-based options for personal and environmental well-being. This success is underpinned by strategic (marketing) campaigns, robust evidence based on research, and the development of new recipes.

### *The evolution of the policy solution*

From the point of view of the public catering industry, such regulatory changes are seen as the result of having identified new trends among consumers' needs and demands as supported by a range of study types conducted in the population, and especially younger consumers. The provision of vegetarian requirements began as an exception. However, responsible authorities quickly realised that this growing demand for vegetarian alternatives was to become a common reality. Legumes as a vegetarian option was not simply selected by consumers as a meat- or fish-protein alternative. Rather, suppliers recognised broad nutritional value of legumes, and that they were less expensive compared to other protein sources. Another significant driver is that their consumption is promoted as a pillar of sustainable and healthy nutrition by food specialists.

The mandatory provision of vegetarian alternatives is first being targeted in the public sector food services. Such activity by responsible public bodies is expected to promote an increase in the consumption of legumes across the general population and will serve as an example to positively influence all other (private) food service sectors. The results of these measures at the national level are unknown at this time. However, at an internal level Eurest-Portugal has identified an increase in consumption/purchases of various types of pulses.

The target audience of these policies (and corporate strategies) at this early stage is mainly schoolchildren and workers from government organisations. Since the consumers provided the initial demand or 'licence' to for legume-based menus, they are set to play a key role in ensuring the continuous improvement and evolution of these policies, and resultant menus, in the future.

It is important to note that such shifts in food culture are not without challenges. The regulations and requirements that surround the inclusion of legumes in the menus place specific and important contractual and capacity obligations on catering companies, as well as supervisory structures which monitor and enforce compliance. Public authorities, who oversee the implementation of measures to improve public health, will remain stalwarts of promoting a healthy, sustainable and varied diet, looking for alternatives that meet the expectations of consumers. However, the impact of new



dietary measures cannot be monitored using any single or obvious baseline indicators. Instead this is achieved by monitoring whole-scale national health trends. Such objectives or targets to promote legume consumption are not clearly defined, though the establishment of recommendations on including legumes in menus, and the parallel monitoring of compliance, could result in greater consumption were the legume-based dishes designed to be sufficiently attractive. Consequently, another useful monitoring tool might be the ‘Sustainability Impact Reports’, which are now a legal obligation for public reporting annually. Scientific data do indicate that locally-sourced legume based commodities generally have lower environmental impacts. Despite these possibilities, the current reality is that services must develop their own monitoring processes to assess whether any change is positive, and at which level (nutrition and/or environment), or whether they need more significant investment.

### *Wider perspectives on the policy solution*

Often, the greatest challenge to overcome when aiming to elicit more-sustainable consumption, is that of overcoming bad eating habits. The basis of damaging food-culture is complex and involves many factors. Since a community embedded strategy can help promote the uptake of alternatives, it is important to maintain a supportive relationship with all the partners involved, and to achieve that public awareness and education campaigns are supported by peers and wider community groups.

In summary, consumer-citizens are leading the increased desire for healthier and more-sustainable food options, and the introduction of legumes and legume-based foods is without doubt an asset to achieve the positive and holistic impacts they desire. Embodying legume-dietary guidelines in company policies and Government legislation will generate clear obligations and help ensure “food justice” (Counihan and Van Esterik, 2012). The main operational difficulties experienced when implementing such policies is not related to the nutritional qualities of the legumes, but rather the high organoleptic qualities of the recipes cannot be replicated due to the lack of legume cooking skills among cooks and kitchen helpers. Another challenge is ensuring that consumers are fully informed of the nutritional qualities of the legume-based alternatives, and in a comparative manner with the standard options. Such approaches have high potential for relatively easy-application on a larger scale, maybe even on a European scale. Validation of new legume-based sustainable-consumption guidelines for new dishes and recipes, underpinned by public-education campaigns and supported by professional and lay-community teams will help transform food-cultures away from the dominant norms and towards more-sustainable home-grown legume alternative.

## 5.6. Hungary: The role of pulses in sustainable public food procurement

Public caterers provide food for over 1.1 million Hungarian people (more than 10 % of the whole population) every day, while children in average consume 35-65 % of their daily energy intake in school canteens (Horváth, 2016). A key argument for changes in the public food procurement system was the high prevalence of obesity and nutrition-related health problems within the Hungarian population (*i.e.* more than 20% of children are overweight or obese in Hungary), but other reasons exist as identified by stakeholders (*e.g.* securing farmers’ livelihood through localised food systems).



Recent reforms and bottom-up initiatives have targeted a sustainable shift from different angles, ranging from governmental regulations to gastronomy-led projects and NGO initiatives. While governmental regulations mainly target public caterers and canteens and to a lesser extent the end consumers, campaigns by private (professional) and social actors focus more on consumer engagement and attitude change both at the consumer and the employee (service provider) level. Nevertheless, public opinion on the shift towards more sustainable public food procurement has been mixed, especially in the beginning, when both consumers (children and their parents) and canteens (chefs) shared their bad experiences or challenges.

### Key players

The key stakeholders (Figure 7) in this case are the government and its regulatory bodies, the public food providers (including caterers, canteens and the staff employed, such as chefs and service providers), the suppliers of ingredients (usually food processors or trade companies but sometimes also farmers), and the consumers and their close environment (*i.e.* in case of school canteens not only children but also their parents can play an important role). Additional stakeholders are professional networks and individual experts, as well as the media, which do not depend so strictly on the public food procurement system but has to influence the decisions made and/or can affect public opinion.

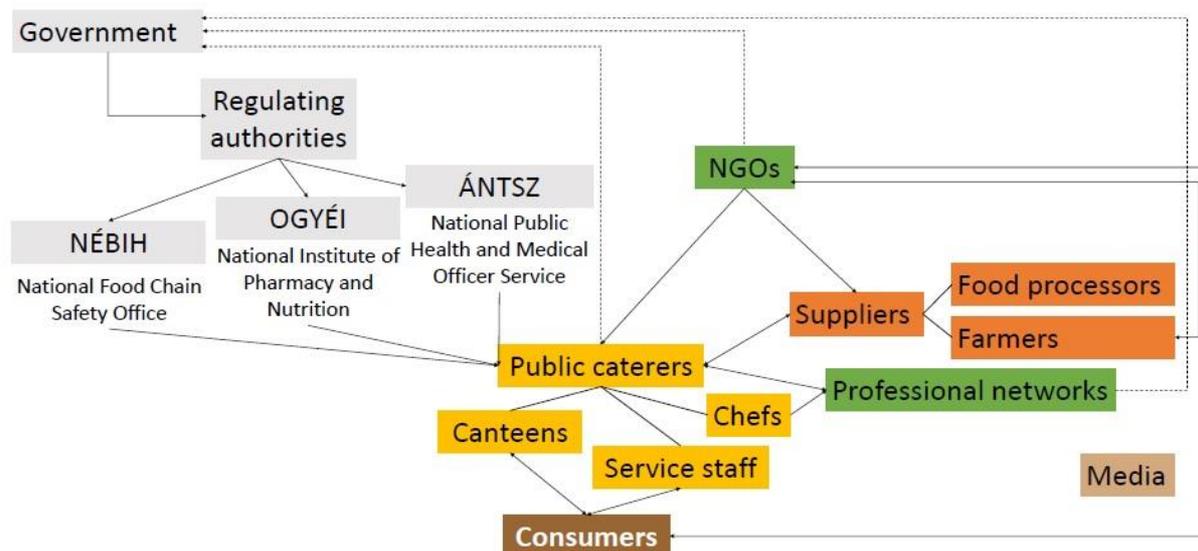
- The major driving force of the ongoing reform comes from the **Government** (especially the **Ministry of Human Resources**) and its regulating bodies. The Ministry is responsible for the overall policy framework of public food procurement, which is currently regulated at the ministerial decree level. Regulating authorities are responsible on the one hand for supporting the decisions that form the policy framework with data and professional knowledge, and for supporting the policy uptake by public canteens (*e.g. via* guidelines, knowledge transfer and monitoring).
- **Public caterers** have to meet legally binding requirements, whilst at the same time cope with strict budgetary constraints, especially in canteens maintained by local governments (*e.g.* canteens in hospitals or public schools). As one of our interviewees said, “*Public caterers work on a profit-oriented way, while the decisions of local governments maintaining the canteens is highly cost-sensitive*”. In most cases, it is the head-chef who creates the menus of a canteen (on a weekly, bi-weekly or monthly basis), depending on the requirements laid down in the ministerial decree. Dieticians are increasingly hired to help composing the menus. However, in most cases, chefs do not have the authority to choose the supplier (not even deciding that a local supplier is favoured to a non-local one), as costs are the major decisive factors within the procurement process. While chefs have a relatively large influence on the menus and to some extent also on the ingredients, they rarely meet the end consumers. It is the service provider staff at the canteen who is in direct relationship with the consumers, and who has to handle the direct feedback.
- **Suppliers.** In most cases these include companies trading and processing food ingredients. It is relatively rare that farmers are in direct contact with a public caterer, although there are a few examples where the local school's canteen (usually in rural settings) established



cooperation with local farmers to be able to serve local fresh products in the canteen. Pulses in most cases are delivered to public food caterers through processing companies. As pulses are produced in Hungary in very low quantities, it is difficult to have direct farmer-canteen relations to provide the necessary supply in leguminous ingredients. This also means that master chefs have hardly any influence on the country of origin of the pulses served in their canteens, which raises concern over the quality of the ingredients. As one interviewee (a former head-chef) indicated, dried pulses originating from China were more challenging to cook (as being harder), and for him, the only solution to secure the good quality of pulses in his kitchen was to increase the proportion of fresh beans and peas which could be sourced from within Hungary.

- **Consumers.** In public canteens, they are usually dependent on the service and have relatively little power to represent their interest. If the food served, e.g. in school or hospital canteens is not tasty or not sufficient, it is typical that food prepared at home by parents/relatives are consumed in addition or as replacement. As for the shift towards more sustainable diets in public canteens, consumers are sometimes blamed (both by regulatory bodies and caterers) as not being open to new tastes, or not being health-conscious enough. On the other hand, there are only a few examples (although the number of such examples is increasing) where consumers could have a say about their preferred choices or the service in general or could participate in attitude forming campaigns.
- **Professional networks.** For example, networks of chefs or dieticians and NGOs play a role in knowledge transfer and build bridges between caterers, consumers, suppliers as well as the governing bodies. They are a source of reliable information as well as international examples, and therefore could fill knowledge gaps from other actors. Their level of influence, however, depends sometimes on the personal networks and embeddedness of a few key individuals.
- **The media.** Within Hungary, the news agencies and popular press appear to have no active links to the public food procurement sector. Although by carefully following the ongoing reforms, it could give voice to consumers and chefs and could increase their influence over the policy framework (c.f. section below on the policy process, especially how the 37/2014 ministerial decree has been revised and amended).





**Figure 7** Mapping stakeholder relationships for the Hungarian public food policy reform

### The evolution of the policy solution

A shift towards a healthier lifestyle, including food consumption at public spaces/workplaces and home, emerged around the millennia. Changes in public food provision can be dated back to 2010 when both professional organisations and regulatory authorities started to promote new nutritional guidelines. In the following, milestones which considerably shaped the policy context of public food procurement in Hungary are listed. While the major driving forces of the ongoing reform came from the governmental level (all related policy reforms are listed), initiatives from professional networks, public caterers and social actors also contributed to changing practices and perceptions (only a selected list of non-governmental initiatives are listed). Most of the listed policy interventions or public/private initiatives focus on healthier lifestyles (and the prevention of food-related health problems) as the major narrative, although they target different audiences and focus on different leverage points. While the consumption of pulses could easily find its way in such a narrative, most of the initiatives listed below do not directly target pulses and consider them among vegetables instead of protein sources.

- 2010: Canteen best practice** (*Mintamenza*) programme started as an experimental programme in the Békés county (South-east Hungary), building on the close collaboration between a chef and public health and public food procurement experts at the county level. This programme aims to increase the proportion of local (Hungarian) and seasonal food as well as organic products in public canteens. Closing the links between public food providers and farmers could create market opportunities for farmers, and at the same time could supply canteens with locally produced (and therefore environmentally more sustainable), seasonal and fresh products (also benefitting the health of the consumer). The programme emphasised knowledge transfer by providing guidelines and professional support to public caterers who join and share information on its website regarding changes in regulations as well as recommendations on how to meet the changing requirements. In 2012, the programme was recognised by the Association of Hungarian National Values and



Hungaricum (also supported by the Hungarian Agricultural Chamber) and expanded to other regions of the country. By 2014, approximately 250 school canteens joined the programme.

- **2011: the Chief Medical Officer of State issued a Normative Instruction and Recommendation**<sup>34</sup> on public food provision, focusing especially on the nutritional values of food served in public canteens. This Recommendation laid down the basis for the upcoming Ministerial Decree and encouraged public food providers to decrease the sugar, salt and fat content of food prepared for public catering. The text of the Recommendation is analysed in the next section of the case study report.
- **2014: the 37/2014 Decree of the Ministry of Human Resources**<sup>35</sup> has been launched to regulate public food provision from a nutritional point of view (the Decree came into force in 2015). This regulation is the cornerstone of the public food procurement reform, as it considerably changed the regulating environment of public food provision, and issued strict limits to sugar, salt and fat contents. The decree also changed the limits to offer pulses on menus. Although the Recommendation of the Chief Medical Officer of State had been a forerunner for this regulation, the new Decree was perceived by many actors (including caterers and consumers) as coming out of the blue, and requiring abrupt changes, which is very difficult to accomplish as taste changes much slower. The text of the Decree is analysed in the next section of the case study report.
- **2014:** one of the biggest public caterers, Hungast, launched its **SuperCanteen** (*Szupermenza*) programme. This programme focuses on changing consumer perceptions and attitudes towards public catering and healthy food and brings a market-oriented approach to the public food sector under the title: “Make trendy what is healthy”. SuperCanteens have been established in some of the canteens run by Hungast, which offer healthier menu choices (based on more locally sourced and fresh ingredients), an ambient environment, longer lunchtime periods, opportunities for feedback, and more information on the menu to consumers. Although this programme is not closely linked to the changes of the regulatory environment and reaches only to specific target groups, it could increase the acceptance of healthier food consumption by making it trendier and more transparent for the consumers and could also serve as a best practice to other public caterers.
- **2016: an Amendment to the 37/2014 Ministerial Decree** has been accepted ([36/2016 Amending Regulation or the 37/2014 Decree of the Ministry of Human Resources on Public Food Procurement](#)), modifying some of the most criticised nutritional limits (especially salt), set out in the original Decree. This amendment was a result of negotiations and lobby activism of professional networks including chefs and public catering companies. Accompanying the amendment, a website and awareness raising programme have been launched by OGYÉI where information related to the Decree is shared with average consumers, and public

<sup>34</sup> [Chief Medical Officer of State issued a Normative Instruction and Recommendation](#)

<sup>35</sup> [Decree of the Ministry of Human Resources](#)



campaigns to increase the acceptance of canteens are launched (e.g. sharing recipes or competition for the title of “The loveliest service provider staff”).

- **2016: an experimental quality control programme for canteens** has been launched by [NÉBIH](#). This programme is not strictly related to the ongoing reforms, rather it focuses on the physical environment (place, availability of cutlery and fresh drinking water, cleanliness etc.) of public canteens. It still, however, can considerably contribute to the consumer acceptance (and attractiveness) of public canteens, and therefore can indirectly support the success of the reforms. In 2017 the experimental period ended, and the quality control is now officially managed by NÉBIH. Results of the monitoring and the qualification earned are in force for two years; then the quality check has to be repeated. NÉBIH publishes results of the quality control on its website, and support the canteens receiving low scores to implement measures which improve their status.
- **2016: amendments to the Law on Child Protection (CCXXIII/2015)** come into force. With the new law the Government broadened the scope of reduced-rate public catering for children by allowing parents to ask for reduced-rate or free public catering services for their children if some specific social conditions are met (e.g. living with financial difficulties, living in a family having more than three children or being disabled etc.), and guarantees that the public catering service is available during school holidays. This amendment had an indirect impact on public food providers, by increasing the number of consumers, and expanding the role of the state in covering the costs of public catering to children.
- **2016: SmartPlate (Okos tányér)** for children has been launched by the National Association of Hungarian Dietetics (MDOSZ). SmartPlate is a webpage and a mobile application, providing user-friendly information on nutritional values of food, as well as different levels of energy demand by age groups. Through this platform, both parents and children can easily get information on how to meet their energy demand more healthily, by using easy proxies for different ingredients and quantities. SmartPlate is in line with the actual regulation (i.e. it recommends minimising sugar, salt and fat consumption), although targets the end consumers with this information, instead of strictly regulating the food providers. In SmartPlate, pulses are directly mentioned as a healthy choice but are considered among vegetables instead of protein sources.
- **2017: Hungast launched the HAMM (National Ingredients in Hungarian Canteens)** programme. HAMM is a collaboration between Hungast and some of its largest suppliers and aims to stabilising high-quality supply, increase the proportion of ingredients of Hungarian origin, and foster joint product development. According to press releases on behalf of Hungast, the HAMM programme also helps to broaden (and better achieve) the goals of the SuperCanteen programme. Although HAMM is not directly linked to the ongoing policy reforms, as public caterers they cannot meet some of the restrictions of the Decree (e.g. salt content) if they continue using the same ingredients. HAMM is, therefore, an example of expanding the impacts of the Decree from caterers to suppliers through partnership along the chain.



- **2018: Canteen Revolution** (*Menzaforradalom*), a public campaign has been launched by Greenpeace. The campaign targets general citizens and aims to increase the proportion of organic food in school canteens. The narrative has three main messages: 1, by providing more organic food in school canteens, children will have healthier food choice (decreasing health risks); 2, Hungarian organic farmers can have more stable market relations, and 3, on the longer run, by increasing organic production, the environment can also benefit from the decreasing use of pesticide. The campaign is in line with the Government's action plan which targets a 30% proportion of organic food in school canteens by 2020. By collecting signatures and crowd-funding the campaign with the help of citizens, Greenpeace would like to increase its arm-twisting to realise the goals of the action plan truly. Although not directly linked to the policy reform of public food procurement, the campaign helps to raise awareness among citizens and puts an NGO into the stakeholder map as a new lobby actor.

### *The policy content*

The 1/2011 Normative Instructions and Recommendations by the Chief Medical Officer of State refers to the Law on Healthcare (CLIV/1997.), which states that the food served in public catering has to meet the specific needs of consumers at different age and social groups, both regarding quality and nutritional value. The Recommendations follow this goal, by creating a detailed guideline on the energy needs of different populations as well as on the nutritional value of different ingredients. Therefore, it can be used as the best available knowledge to create the menus for different consumer groups. The Recommendations suggest best practices on how to plan menus, ensure the variability of food, how many times food should be provided for consumers of different ages or in different public services and how to inform consumers about the nutritional value and ingredients of the food served. It promotes the consumption of milk and dairy products (on average 0.5 litres of milk *per* day or equivalent dairy product), as well as vegetables and fruits (in average three portions *per* day of which one portion has to be fresh) and cereals (two portions *per* day in average) for each consumer group. The Recommendation limits the use of fat, sugar and salt, and suggests avoiding soft drinks. Meat and meat-based products are recommended to be served each day. In the Appendix of the Recommendation, a table is available with detailed information on recommended portions of different food types and ingredients. Pulses are listed among vegetables and are not allowed in childcare services for children under the age of three years old. The frequency of serving pulses is also limited, although not in a transparent way: all year around pulses are served to a maximum of three times in every ten days, but in the wintertime (from October to April) it is required to serve pulses at least once every ten days. The target implementers of the Recommendation are the public caterers and especially the head-chefs or the dieticians who create the menus for the different age and consumer groups, although indirectly the Recommendation can also influence consumer choice – where the reasons for this Recommendations are clearly explained to the public.

The 37/2014. Decree of the Ministry of Human Resources on Public Food Procurement follows the 1/2011 Recommendation in its goal, structure and main content – with this policy document the directions laid down in the Recommendation come into force as a Decree, and hence become coercive. The Decree limits the use of sugar, salt and fats in the same way as the Recommendation (and forbids freely available sugar and salt containers within canteens), and promotes vegetables and fruits, cereals (including whole grain), milk and dairy products, as well as meat consumption. It





states that each main course had to contain meat-based protein but did not include pulses and legumes as further protein sources. Equally, home-grown legume-based meat products are not discerned. Pulses, as already described above, are considered among vegetables. A favourable change for pulses is that the Decree allows the serving of cold courses (e.g. sandwiches) with leguminous plants (previously pulses were allowed as ingredients of soups, stews, salads or side dishes). The frequency of pulse servings remained the same, i.e. from October to April, one-three meals in every ten days, and from May to September, maximum one meal in every ten days, except in childcare for children under the age of three years old, where pulses cannot be served. Similarly, the Decree targets mainly the public caterers who provide food for different consumer groups in public canteens. However, the strict limits of salt, sugar and fat content and the relatively huge frequency of dairy products affected not only the caterer companies, but also the consumers, who in most cases were accustomed to food with different organoleptic qualities.

The 36/2016. Amending Regulation of the 37/2014 Decree of the Ministry of Human Resources on Public Food Procurement was launched after severe criticism from citizens (consumers) was raised and publicised in mass media, and negotiations were initiated by professional organisations (caterers and chefs). The major changes, issued by the Amendment, focused on alleviating the strictest limits for some ingredients (e.g. salt) and modifying the size of the portions, but also made some practical changes regarding controls, information provision and requirements related to human resources. No changes were made in relation to pulses.

### *Wider perspectives on the policy solution*

Promoting healthier food consumption, both at private life and in public catering, is a widely accepted narrative today in Hungary. Therefore, in general, the relevance of the policy reforms on public catering is not questioned. However, following our interviews and media analysis, it is clear that stakeholders are not equally satisfied with the results so far, and there has been, and still are, conflicts between different groups. Public authorities tend to assess the reform as a success story, even if some regulations are challenging and not met everywhere (OGYÉI, 2018). They appreciate the changes in primary school canteens, where new ingredients were launched, the proportion of freshly served vegetables and fruits increased considerably, and fat and sugar content were reduced. However, they also acknowledge that providing detailed information remained a challenge for canteens, as well as serving the minimum requirement of milk and dairy products, whole grain cereals and nuts. It is also acknowledged that in school canteens the number of complaints from parents increased since the Decree came into force, that the time available for eating was too short, and the funding provided to caterers did not cover the increased costs. The Decree also failed to increase the proportion of small-scale farmers as suppliers to public caterers.

From the consumer point of view, satisfaction seems to be limited. According to a recent study, food waste in school canteens is around 20-25% of the total food served (Bittsánszky, 2018). In media releases, canteens and public catering, in general, is often blamed for serving ugly and tasteless food, and eating habits are said to be slowly changing, which has not been considered by the interventions launched by the Decree. On the other hand, caterers blame children and their families for not being aware of the healthy food choices, not knowing certain ingredients, or simply not encouraging habits of preparing food and eating at the table. Thereby undervaluing the food and



food-culture encouraged by canteens. One of our interviewees (former head-chef of a public canteen) shared several stories when school children started to play and waste the food which was difficult to bring in the canteen as being expensive or rare (e.g. high-quality grapefruits or dark chocolate, offered as the Christmas present). Such tension between the end consumers and the food providers hinders the reforms and raises questions on the significance of knowledge- and capacity-gaps regarding available information, attitude and experience of canteen staff, and food culture in general. Education initiatives and personal-capacity building exercises delivered by organisations such as SzuperMenza, HAMM, Merőkanál help accommodate and effectively deliver the policy reforms as they directly target the relationship which is built between the caterer and the consumer.

Assessing the policy reform for legumes, one can say that none of the recent changes focus directly on legumes and therefore could not have a real impact on legume or legume-based product consumption. This will remain the case as long as legumes remain to be considered only as vegetables and are not accounted as commodities of high nutritional value in their own right and are acknowledged as such in menus. However, and compared to former regulations, our interviews also shed light on the fact that the current representation of legumes and pulses in particular in public catering is already improving. This recognition was achieved mainly through lobbying and activism of a professional gastronomy network (TÉT Platform). Discussions with authorities also highlighted that they are open to scientific studies and international best practice guidelines which underline the benefits of legume-consumption. A recent study showed that green and dry legumes are relatively favoured choices by consumers in canteens (lentils being the most favourite, followed by kidney beans, green pea and green bean) (Bittsánszky 2018), although there is a lack of knowledge of their nutritional values, and they are often perceived as problematic as they are difficult to digest.

The main lesson learnt from the Hungarian reform of public food procurement is that regulatory changes can force the sector to a healthier direction, but culturally embedded eating habits and (the lack of) knowledge and awareness can make the system inert. Private and social initiatives are important to increase the acceptance of legal reforms and create trust between the parties. Bringing healthy food at the forefront of public debate can also make room for promoting pulses. Therefore, the current reforms discussed in this report can be considered as a leverage point to push forward legume consumption.

### 5.7. Scotland: Leverage points for increasing the policy support of legume-based systems

Scotland consumes great quantities of legume-based or -derived products, but they are mostly imported for animal feed and not consumed directly. The main question is: *how home-grown grain- and forage-legumes cultivation can be increased to deliver their many benefits?*

#### Background

Most of the legumes grown in Scotland were brought into the area following the beginnings of settled agriculture in the Neolithic. Legume categories that have been grown here include grain legumes – peas and beans; forage crops – e.g. vetches, tares, sainfoin and a low extend currently.



Lucerne; and more extensively legume-grass swards – e.g. clovers such as red, crimson, alsike and white. Historically, natural woody legumes have been fed to farm animals, the main one being gorse or whin (*Ulex* spp). A few other grain legume species such as lentil have been tried historically but have not been grown commercially. Forage and grain legumes were widely introduced and expanded in Scotland during the early agricultural improvements after 1700. By the 1780s, reports indicate that peas and beans were grown in cereal-based agriculture 1 in 4 years to 1 in 12 years in many localities, though the absolute areas covered were not recorded. Similarly, ‘grass’ seed for establishing pasture typically consisted of various grasses, but also one or more legumes, usually clovers, and other species.

Crop census records have been available since 1854, but the single problem that prevents any accurate assessment of the importance of legumes is the absence of records of forage legumes in grassland. Excluding rough grazing, the managed grass occupies about 50-60% of the agricultural land, the remainder being arable and rotational grass. The only available data refers to grain legumes and sown forages in the arable sector. Census data show systematic declines in the areas sown with legumes after the 1850s, reaching a minimum in the 1930s when they occupied less than 0.5% of the arable surface. The demise of grain and forage legumes up to the 1930s has been attributed to several factors, including the increasing adoption of potato as the staple food of rural populations, and the continued rise of legume-grass mixtures as the primary animal feed (various chapters in Farm Crops, 1925).

The decline of legumes in Scotland occurred mostly before the 20<sup>th</sup> century agricultural intensification (1960 to 1990), but the increased needs during this time for nitrogen fertiliser and feed were met not by increasing home legume production, but relied on synthetic, i.e. industrially manufactured, nitrogenous fertiliser and imports of high protein animal feed (mainly soya). Increasing wealth in the population and improved global trade meant that human needs for legume food products were also met mostly by imports (e.g. ‘baked beans’, lentils, peas, chickpeas, tofu, ‘peanut’).

The area of land growing legumes in Scotland is now very low by global standards. Pulses (peas and beans) occupy around 1% of the area covered by arable and rotational grass, forage legumes grown as crops have all but disappeared while legume-grass forages are unrecorded but have most likely declined (Agricultural Statistics Scotland 1912-1978; Economic Report on Scottish Agriculture 1980-2017). There is also a category ‘other crops for stock-feeding’ which might include some remaining forage legumes. Census records together with information from the EU’s Integrated Administration and Control System (IACS) indicate that two species of grain legume, faba beans and peas, are now grown as field crops, and each is produced for both animal and human consumption. In addition, beans from the genus *Phaseolus*, such as runner and French beans, are grown on a small agricultural scale and in gardens. IACS can also provide detailed information on the geographical distribution of these legumes, indicating that they are grown in a wide range of soils and crop systems from moderate-input rotational grass and spring cereals to high-input winter crops with or without potato. Intensification has not erased grain legumes from high-input agriculture; and while some (e.g. peas and beans for animal consumption) are grown over much of the arable-grass land classes, those crops for human consumption are concentrated in high-input regions within a short travelling distance to processing plants.



### Key stakeholders of legume-based systems

A recent assessment (Iannetta *et al.* 2018) highlights that the legume component of current cropping systems in Scotland could be increased from its present 1% to 10% or 20% by replacing mainly spring barley and, to a lesser degree, certain winter crops: or by using legumes to support the cereal (barley) dominated cropped systems. Savings of 20% or more in nitrogen input across typical cropping sequences could be realised with shifts in mono-cropped choice, or higher if intercropping were to be widely adopted. Evidence from on-farm trials shows that grain legume output could be increased by better agronomy and crop improvement. The main requirement for increasing legume inclusion is, therefore, demand for new home-grown or provenanced (and ethically produced) legume-based products in the food, feed and processing industries. Agriculture in Scotland primarily supports animal breeding and alcohol production. The former has become highly dependent on imports of protein-rich feed. Some food for human consumption is grown locally (vegetables, potato, rapeseed) but much is imported, for example nearly all cereal-based and legume-based products. Any programme of legume expansion must, therefore, understand these supply chains, not directly compromise them, but seek to infiltrate them with a positive effect and at the same time generate new markets for human food.

Such transitions, in the processing, would likely demand new and cooperative business models and governance structures that should include the growers firstly and to ensure a sound agronomic knowledge based to enable more legume-dependant cropping systems. Also, breeders as a source for best-fit-for-purpose types, seed traders and suppliers to major pre-processors and processors, which including for grain legumes dehullers, millers and starch-protein fractionating specialists, food- and feed-technologists, compound feed manufacturers plus marketing and retail specialists). Going forward, various forms of biorefineries may also be recognised as legumes-processors as sources of, for example, energy (*via* AD, or anaerobic digestion), or isolated protein from crops which historically would have been used directly as whole crop forage (*i.e.* animal feed).

Key stakeholders along the major legume-oriented supply chains are the following:

- **Farmers:** To comply with aspects of CAP Greening, several farmers have sown mixed forage legumes (e.g. red, white crimson clovers) which have been established successfully, though their production capacity is not known.
- **Processing facilities:** there is currently an absence of legume processing facilities in Scotland, which is a limiting factor for developing innovative legume-based products. There are no dehullers, only one miller (small scale and pea mainly), and no dry- or wet-fractionation facilities to separate pulses into their protein and starch components. There are, however, Scottish companies on the verge of investing in such a processing site south of Edinburgh, and they are seeking support for this major capital and infrastructure development. If established, it would present a new Scottish capacity that would not just benefit arable- and fish-farming but also present sustainable food ingredients to support and diversify Scotland's existing food and drink industries.
- **Trade companies/importers:** play a very important role in aggravating produce for major processors, and for export to largely human food markets in North Africa (e.g. Egypt). The





UK (and Scottish) pulse industry represents a source of high-quality grains, and so is commercially attractive, and increasingly competitive. The main seed traders in this market are companies such as [Frontier Agriculture](#) and in Scotland companies [W.N. Lindsay's](#), and increasingly for Scottish pulses ([Cefetra](#)).

- **Meat, aquaculture and fermentation industry:** The Scottish foundation businesses for meat, aquaculture and fermentation (alcohol) based products may all be supported by greater use of legumes whether as forage or pulses. Concerning grain legumes, it is important to realise that the parts of the grain are worth more than the whole. Thus, grain legumes which are fractionated into their hull (skin), starch and protein components are of great commercial value, since the individual fractionated products are demanded by various industries: for example, hulls for pet food, protein by aquaculture, starch for animal feed and various parts for the rapidly growing human food markets.
- **Consumers** in Scotland are by and large passive actors in the food system. Nevertheless, consumers' attitudes are slowly changing, initially restricted to more affluent socio-economic parts of society. Citizens increasingly desire access to flavoursome food, that is also nutritious and produced, processed and delivered in a manner which has safeguarded biodiversity and ecosystem function. Also, such food must be affordable and commercially competitive.
- **Regulatory authorities:** there are specific regulatory authorities governing legume use in Scotland or the UK. There is a voluntary levy-board in the form of the [PGRO](#) (the Processors and Growers Research Organisation), which is positioned to influence related policies on synthetic nitrogen fertiliser use, water framework and pesticide (including herbicide) directives. It also helps direct research nationally to best address the needs of its members who are largely growers, but which also embrace other key stakeholders such as breeders, seed traders This is in contrast to the compulsory level board which presides in Canada for example ([Pulse Canada](#)). Among the seed providers, there is greater regulation for grain legume crops as breeding companies operate to ensure key quality attributes such as to ensure optimal percentage germination and minimal disease risk, the latter often using antifungal seed treatment, and pesticide recommendations. Agencies such as [ADAS](#), and [FERA](#) work to help regulate the use of pesticides in cropped system. The remit of FERA also extends to assessment of food qualities and issues of compliance to national food and environmental agency standards. In contrast, the cover-crop (legume) seed industry is self-regulating. In Scotland, much of the underpinning research to ensure more sustainable consumption, and efforts to inform policy on legume supported agri-food systems, is delivered by the MRPs (Main Research Providers, listed [here](#)), to the Scottish Government.
- **Research and innovation sector:** Beyond the operations of specific private companies which to develop their markets, conduct pre-commercial research, which is on the whole restricted to the Scottish University and Technical Training Colleges, and especially the latter since there is a major decline in the popularity of plant sciences at University level. Where this is pursued, this is largely from molecular and genetic-based perspectives. However, Food Science and Technology course are taught in metropolitan centres in Scotland, and mainly Glasgow and Edinburgh (see [here](#) for more info).



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### *Existing policies for incentivising legume production, processing and consumption*

There are specific targeted policies regarding legumes use in Scotland. Increasingly, there are campaigns aimed to address ‘hidden-hunger’ and nutritional limitations from NGOs such [Nourish Scotland](#), and their ‘good food nation’ Bill, calls for “joined-up legislation on food, farming, and health”. The Bill has been adopted in part by the Scottish Government, and its implementation includes an objective that every Scottish City must establish a “Good Food Policy”, that includes promotion of ‘food and drink education’, and ‘sustainable production and procurement’ (see [Scottish Government Food and Drink Policy](#) for more information). Regarding the latter, local authorities are being supported by the efforts of other NGOs in that regard too, organisations such the [Soil Association](#) (Scotland) work directly with local authority procurement specialists to help ensure that the food are produced as sustainably as possible, e.g. locally, preferably organic, direct from farm-shops and or wholesalers. However, there is no specific monitoring of the extent to which the food sourced is leguminous or legume-based.

In response to policy (in)action, private sector-led initiatives emerged recently with a strong future potential of increasing the share of legumes in production and consumption. These include the following options, among others:

- **using legumes in animal feed, especially in aquaculture:** aquaculture in Scotland has developed as a major industry relying, like much of land animal production, on imported feed, mainly derived from the legume soya bean. In recent years, components of UK-grown field bean have also been used in the manufacture of fish food to a limited extent. Industry estimates 36,000 ha of arable land yielding beans at 4.5 t/ha would satisfy current aquaculture demands, however, any planned programme of legume expansion should take into consideration (and resolve) the consequences of the reduction in barley area. A further limitation of using legumes in aquaculture as animal feed is the current lack of processing facilities.
- **developing new products-based on home-grown grain legumes:** there are products based on home-grown grains legumes for which markets are probably much smaller, but the technical infrastructure is already present. For example, beer made from home-grown faba beans is already on the market and bread made partly with bean flour is at the stage of design and trialling.
- **using new legume varieties and innovative practices:** given the expansion of global genetic improvement programmes in the pulses, it is likely that much greater range of germplasm is available now than would have been to 19<sup>th</sup> century innovators. Trials are underway for several species/varieties, including *Phaseolus* species as vegetables, lentils as a field crop, and soybean and lupin as a forage crop.
- **promoting public health and dietary change:** the proportion of overweight and obese people is rising, and diabetes is a major health cost burden both globally and in Scotland. However, where legumes can be adjunct to meat products, they lower the energy density of processed foods while also enhancing their nutritive value. Plant proteins are also increasingly promoted as a response to the demands of consumers and health professionals.



for versatile functional ingredients, or as biologically active components, rather than as essential nutrients. For example, the enrichment of human foods and animal feeds with legumes is claimed to improve overall nutritional status. While pulses such as peas, beans and lentils cannot provide the full range of essential amino acids demanded for adequate human nutrition, legume-based diets can be supplemented with other vegetables, dairy products, and fish.

### *Wider perspectives on policy solutions*

Achieving the full potential of legumes provides an opportunity to effect fundamental transition in approach and attitude across all sectors of the supply chain. In particular, change is needed towards production methods that ensure the integrity of Scotland's managed ecosystems. The transition-paths from cropping systems that depend on synthetic nitrogen to ones based on biological nitrogen fixation by legumes need support from a series of interventions and developments that range from research and education to supply-chain capacities and consumer preferences. Expanding government funded legume research programmes is necessary to devise future sustainable cropping practices e.g. mixed cropping, conservation agriculture, organic; and serving a range of commercial and processing streams, that are suited to the Scottish pedoclimate. Government intervention through policy legislation, infrastructure and market development is needed to enable farm level economic initiatives and innovations that include legumes, and the development of legume supported value (or supply) chains.

### 5.8. Argentina: The export tax policy on soybean

Argentina is the top world exporter of soybean meal, and the third largest exporter of soy oil, thus soybean constitutes the basis of the country's primary exports. However, the country does not account for a structurally planned, consensual, nor long-term public policy concerning soybean production and trade. This export value has been a main determinant of the institutional and policymaking environment which has geared Argentina's export tax policies and macroeconomic strategy towards favouring the exporting-soybean sector.

### *Background*

Policy initiatives surrounding the soybean sector in Argentina have been somewhat volatile and adapted to the contexts marked by broader socio-economic plans and the influence of the markets. In this context, from all policies directed to the soybean sector, the export tax policy has been by far the most sensitive. Locally referred to as 'retentions', they are customs duties applied to the export of soybean products, usually combined with quotas, licenses and other administrative measures. While the use of this policy strategy has a long history in the local agricultural sector, the goals have been diverse, responding to economic and social contexts. For the proposed period of analysis (2001-2018), the primary goal has been to obtain fiscal resources to facilitate diverse income distribution initiatives, and so limit the boom-to-bust cycles of soybean prices that emerge due to stochastic global grain markets. Thus, the distribution initiative is especially targeted to prevent increased domestic food prices. The relative importance of the export tax measures reached a peak between 2001-2018, becoming the central issue in local political debates regarding the soybean



sector and the local economy. Political implications surrounding Argentina's tax and export policies allowed the strategy adopted to profit from high international prices; and resulting in negative impacts on local food prices; the lack of existence of a basic plan for soybean production and development; and the modes and processes of public policies formation performed in Argentina.

### *Key players involved in the export tax policy on soybean products*

The state is the pivotal actor determining the export tax policy, as it is the stakeholder implementing the regulation in order to serve its policy and income needs, but also to use it as a strategy to somewhat regulate and direct the sector. The soybean cluster actors affected by the initiative involve farmers, private investors and transnational corporations. From this heterogeneous group, the most directly affected are the soybean exporters, which are also the main soybean industrial processors. Others affected include: the soybean producers and, to a lesser or more indirect extent, the rest of the economic actors whose businesses depend on soybean cultivation such as input providers (seeds, fertilisers, agrochemicals) and other services' providers (harvesting, transportation, conditioning, storing, research institutions). Finally, as the measure affects the whole economy, civil society is also impacted.

- **State:** As the enforcer of the export regulation, the state has been the key stakeholder driving the situation. In that regard, the export taxes are unilaterally decided by the government. As the Argentine Customs Code (Law 22.415 and modifications) conveys a legislative delegation to apply export duties in favour of the executive power (*i.e.* the government). Although the legitimacy and legality of this delegation is a contested fact, it is a standard feature of policymaking in presidential countries like Argentina, where the Branch wields enormous power to apply special measures or 'decrees by need or urgency'. Through the application of export taxes, the state has aimed to obtain fiscal resources from sectors that experienced extraordinary gains throughout the soybean boom, and largely due to high international prices and steep currency devaluations. Income from this tax has also served to accumulate significant amounts of foreign currency, relieving constraints from the external sector, such as repaying public debts contracted with foreign creditors. In this sense, the central aim surrounding policymakers with regards to the export tax has been to achieve these internal fiscal goals (and trying to maintain level food prices) whilst allowing soybean production and export to remain competitive.
- **Trade and processing industries:** As the same firms dominate both these sectors, they are analysed jointly. Exporters are the primary targets of the export duties, as they perform the taxable event (export of soybean products) and execute the payments. However, exporters deduct this amount from producers, by paying less to purchase the soybeans. These actors, large agribusiness, are the major determinants of pricing across the international soybean commodity chain. Leading firms include both national and transnational conglomerates: Cargill, Dreyfus, Bunge, Glencore, COFCO, AGD, Vicentín, Oleaginosa Moreno, Molinos Agro, ACA, YPF. With large-scale, state-of-the-art processing and exporting facilities, they wield a dominant position as they concentrate roughly 85% of the local crushing capacity and 88% of soybean exports. Both sectors have benefited from differential export taxes for refined products; differential import taxes by which they purchased oilseeds at lower than export prices; and recurrent currency devaluations during the past decades that have allowed a significant income



gain, and which is only slightly offset by the application of export levies. From this position, they have dominated a very dynamic market with high international demand and have become critical to the local economy as around 30% of Argentina's export income comes from the trade of soybean products. Besides being highly competitive, these businesses are diversified and vertically integrated (*i.e.* they own many links of the supply-chain), and so each account for a significant portion of production. For example, this small number of companies own (or and contract) a significant proportion of the farmland in their ownership, which also includes storage plants and port terminals; they also provide inputs and services; the latter extends beyond agrichemical supply to finance (*i.e.* loans to producers) plans. Although sophisticated and well resourced, with a wide international presence, in Argentina they represent a scattered geographical distribution and lack of cohesion for collective action. However, individually these businesses exert considerable influence over local policy-makers and their initiatives determine the structure and impacts of the whole soybean supply-chain, and connected socio-ecological components of the national agri-food system.

- **Soybean producers:** Soybean producers constitute a heterogeneous mix of farm types, and are fragmented across more than 100,000 companies, from multinationals to small farmers. Land-owners and machinery contractors, who also perform as producers are also part of this mixture. This is allied to specialised teams which manage production for third-party investors, processing firms and traders. Despite this diversity, soybean production in Argentina is dominated by less than 3% of firms, who yield more than 50% of the country's production. The operations of this small group of medium- and large-scale agents are led by a sophisticated 'organisational' approach, which is characterised by a high level of mechanisation, capital-intensive production methods and includes lobbying government and key (global) actors in the global business and political areas.

While soybean producers are not the specific targets of the export tax policy, the policy does serve a production-tax, as exporters deduct duties from the price paid to farmers, who consequently realise a low price for their produce. Producers therefore appear as the ones bearing the tax imposition. This is largely burn-out by how the commodity and products margins are partitioned across the 'value chain', which allows highest gross margins to those supply chain operators who are closest to the end-user or consumer. Farmers therefore strongly oppose the policy, which they consider confiscatory. Given their crucial role in the supply chain, plus an important economic and political power, the agrarian class could wield over policy-makers. This was evidenced by the agricultural lockout and collective mobilisations during the 2008 conflicts involving modifications of the export tax policy. The farmers also were among the supporters who helped elect Mauricio Macri as President of Argentina (in 2015), as he planned the removal of the export tax and the implementation of business-friendly policies towards the sector (the section on the "Current status" shows how such policy reform has been achieved).

- **Inputs and services providers:** The export levies do not directly implicate input- and service-providing actors, but their businesses depend on the performance of the sector and are therefore affected by the policy (particularly the seed and agrochemical suppliers). During the decades of the soybean boom that followed the 2001 crisis, they all experienced dramatic growth, as they provided innovative technologically-based input packages and specialised services that drove highly productive and competitive production. Seeds and agrochemicals



used in soybean cropping are provided by the same main firms, around fifty small and medium-sized companies and major international corporations, including Monsanto, Syngenta, Dow AgroSciences, Pioneer, Advanta, Bayer CropScience, Nidera, Nufarm, Pannar RSA among others. These actors provide the key technological package of transgenic glyphosate herbicide-resistant seeds as a cornerstone of the main commercial-soybean model, and therefore closely follow soybean policy-making. Almost all the soybean grown in Argentina is transgenic, giving these actors an influential position in the policy-making towards the soybean-based supply-chain. The fertiliser industry, on the contrary, is not dependent upon soy agribusiness as fertiliser used in soybean cropping is rather scarce. Supply is concentrated in a small number of large and competitive firms (Cargill, Bunge, Nidera, Dreyfus, AGD and the coop. ACA), with a developed distribution network, most of which are also large traders and crushers. Actors performing other services (on-farm operations, transportation, conditioning, storing) mostly comprise equipment contractors, carriers, country dealers and cooperatives. While these actors tend to oppose the export-tax policy as it constrains the soybean agribusiness, they can partially offset this *via* the supply of provisioning services to supply-chains for other crops.

- **Civil Society:** Though indirectly and more ambiguously affected by the tax policy as the soybean boom developed, and both the economic and environmental implications became visible, civil society gained increasing interest in policy-making towards the soybean sector. When in 2008 an export tax reform was enforced by the government, the retentions became the centre of a political debate dividing society between those supportive of the measure and those against it, in an intense conflict of national dimensions. Additionally, non-governmental or civic organisations have appeared as critics of the soybean export-tax policy and have highlighted the high socio-economic, environmental and health consequences of soybean cropping. Their activities have influenced the general populations perception and awareness of the negative impact of the soybean-(production-)tax policy.
- **The European Union:** The EU is by far the world's top soy meal importer, as it uses it as high-protein feed in the livestock and poultry sectors. Its trade decisions have substantial influence over Argentina, since the country is the EU's top supplier, providing more than 60% of the EU annual consumption of soybean meal<sup>25</sup>. The on-hold Free Trade Agreement between the EU and Mercosur (South America's Common (trade) Market) raised local expectations with regards to increasing their market access for soybean products (e.g. biodiesel). The removal of soybean export taxes would reduce the price paid by EU importers, improving the food security in Europe, whilst at the same time raise domestic prices further compromising local food security.

### *Evolution of the export tax policy between 2001-2015*

Even though Argentina has a long history in the use of export taxes, quotas and licenses as policy instruments for primary products, the analysis presented here refers to the period from the 2001 crisis to 2015. During this period implementation of the soybean export tax policy coincided with dynamic increases in global soybean trade and reached a historical political and institutional peak in terms of the large increases in production of soybean and, despite this, escalating soybean prices due to unprecedented levels of demand.



- 2001-2002. Re-installment of the soybean export tax policy after the 2001 crisis.** The soybean export tax policy remained absent until after the severe 2001 financial, economic and social crisis, which led to the end of the poor levels of national currency convertibility which emerged during the 1990s. The financial collapse that followed led the Argentine Peso to be devalued by more than 200%. In this critical context, tax on exports of soybean (and all strategic agricultural commodities) were re-installed, amidst other regulating policies. The measure was implemented through a Presidential Decree, that justified the regulation based on the "*acute condition of public finances*", and the need to, "*downsize the effect of the currency devaluation over domestic prices*" (PEN 310/02). The content of the policy was thus shaped and designed by the government. Because currency devaluations imply an increase in the price of domestic products and services, with critical consequences in a context of economic and social emergency, and because they translate into a massive income transfer towards the exporting sectors (only partially offset by the export taxes), the implementation of custom levies on export products provides an income distribution solution, allowing cash transfers to the most vulnerable social sectors. Initially, the tax level was set at 13.5 % for the export of beans and 5 % for oil and meal (MEI 11/2002) and was later increased in the same year to 23.5 % and 20 % (MEI 35/2002), respectively (percentages *ad valorem*). The initial period proved crucial in alleviating the situation.
- 2003 to 2007. Massive profits and increasing export taxes.** The currency devaluation added to the crop's high profitability and elevated international prices of soybean and soybean-based products significantly stimulated the sector during these years. Exports of soybean was boosted and conveying exporters enjoyed large trading profits. This situation pushed forward the demand for local primary production of soybeans and processed products such as meal, oil and biodiesel. The production of this latter was significantly bolstered by the biofuels-promoting initiative implemented by policymakers in 2006. Later, in 2007, the Ministry of Economy passed a resolution implementing an increase in the tax levels to 27.5 % for beans, 24 % for oil and meal and 5% for biodiesel, arguing that, "*... the demand for soybean products describes sustained growth*" and that, "*the sector's profitability will remain suitable*" (MEP 10/2007; PEN 509/07). By the end of the year, with international soy prices reaching new peaks, new raises were enforced, reaching 35% for beans and 32% for by-products, with the claimed goals being the...*reduction of domestic prices, consolidation of the income distribution and stimulation of value-adding activities*" (MEP 369/2007). Despite most, if not all, of the actors participating in the soybean market, and the mainstream media, manifested disagreement with the soybean export tax policy, pondering the confiscatory character of the measure and its discouraging effects upon production, exports and investment. However, the high profits obtained across all sectors prevented major conflicts between the policymakers and the soybean supply-chain players. The export tax policy represented the cornerstone of the national economic development model which was applied during these years. The approach relied heavily on the soybean export sector for domestic financial income generation, and the measures did not offset soybean's profitability nor lead to a contraction in production.
- 2008. Export tax mobile scheme sets the agricultural sector on strike.** With new record soybean prices, the Ministry of Economy created a mobile retentions' scheme linking the tax



level to the soybean 'Freight On Board' (FOB) price<sup>36</sup> (MEP 125/2008). This was intended to isolate soybean prices from international fluctuations, by preventing the full transmission of international prices. It generated considerable opposition from all the sectors of the national soybean businesses, particularly farmers and exporters who claimed the rates were potentially confiscating. Tax levels were raised to almost 41 %, though could potentially increase up to almost 49 %, depending on the soy FOB price. At FOB prices greater than US \$ 600 *per* tonne, the marginal tax increase became 95%, practically eliminating the possibility of further income profit with higher soy prices. The initiative faced stiff opposition from all the soybean chain actors, the media (which played a key role) and a significant part of civil society. The agricultural sector went on strike, leading to an intense conflict of national dimension that lasted for more than three months, during which the retentions became the centre of political debates, dividing society between those supportive of the policy and those against it. After unsuccessful modifications, the initiative was sent to the Congress for approval and was rejected by the Senate.

- **2009-2018. Retentions persist amidst worsening macroeconomic conditions. Macri's election and plans for tax elimination:** For the next years and up until 2015, the export tax level to soybean products remained practically unchanged. In 2009, confirming the income distribution strategy, the government used 30% of the tax income to create a federal fund to finance public works in sectors such as health, education, housing, roads and others (PEN 206/09), targeting vulnerable and low-income sectors. This fund facilitated distribution of the tax income among provincial and district administrations, a measure that had been demanded by several political actors. During the years which followed the 2008/09 global financial and economic crisis, the Argentine Peso appreciated against the US dollar, and in a context of high local inflation, higher production costs, lower international commodity prices and high level of export taxes, the local soybean cluster lost competitiveness. The situation worsened as other relevant soybean producing countries (Uruguay, Paraguay and Brazil) depreciated their local currencies relative to the US dollar. In 2010, pressures from the political opposition were exerted to shift the Executive Power's attribution to implement retentions towards the Congress, aiming for eventual removal of the tax policy. In 2015, following the election of Mauricio Macri as president, who has made clear commitments to adopt a more liberal attitude towards trade and production in the soybean and exporting sectors, the regulating framework of the export policy is expected to shift considerably.

### *Current status of the export tax policy on soybeans*

The current political economy strategy directed towards soybean production and trade is being shaped by the more liberal economic vision of Macri's administration. Compared to the Kirchner's and Fernández's policymaking that shaped the policy between 2003 and 2015, the current strategy presents completely opposite goals towards export tax policy: the former gave a central role to the use of export duties as a macroeconomic tool in their economic model, conversely, Macri's government pursues- reduction and eventual elimination of the soybean export tax as an instrument

<sup>36</sup> The FOB indicates whether the seller or the buyer is liable for goods that are damaged or destroyed during shipping. The FOB price includes the delivery cost in the commodity or products purchase price. The FOB prices are determined by the destination port.





to drive fiscal policies. Indeed, during the first years of the new administration, several initiatives to modify and reduce the export tax were undertaken. In December 2015, four days after assuming office, the Executive Branch implemented the reduction of the tax level in five points through a presidential decree (PEN 133/2015), from 35 to 30 % for beans, and 32 % to 27 % for by-products. Similar changes followed throughout the following year. In 2017 came the announcement and application of several new measures were made and in January, a gradual reduction of the soybean tax scheme was applied, setting a 0.5% monthly decrease until the year 2019 (PEN 1343/2016) In February, the implementation of the denominated, "*Belgrano Plan Agricultural Incentive*", where a 5% rebate to export taxes was offered to soybean producers of ten northern provinces, as part of a broader policy strategy to boost agricultural production and economic development in these regions came into force (MA-AFIP 3993-E/2017). Finally, at the end of the year another decree reduced the tax retention for biodiesel exports, from 20 % to 8 % (PEN 1025/2017), though this was later reverted at the beginning of 2018, setting the level at 15% (PEN 486/2018).

As anticipated, these measures, which significantly improved the situation for those actors most directly implicated by the export duties policy (namely exporters and producers) and generated great expectations that led to further expansion of soybean production and exports. However, it would seem that although the present administration is committed to bolstering the sector by removing harmful regulations and providing a better environment for business, explicitly engaging to leave the export tax policy behind (an "absurd" tax in the words of the Ministry of Agriculture, Luis Etchevere), this would not seem so straightforward. The present financial and economic turmoil stimulated by an accumulated currency devaluation of more than 100%, has imposed an interruption and re-discussion of the tax reduction policy. This is due mainly to Argentina's weak economic activity; escalating domestic prices; and, increasing currency needs due to recent public debt acquired with foreign creditors. Through the presidential decree 757/2018, the government suspended the gradual tax reduction for soybean oil and meal for six months, though the same remained unchanged for beans. The projected budget for 2019 recently discussed in the Congress, anticipates an increase in soybean taxation for the year 2019, from 30 to 33 %, in order to obtain much-needed income resources. Ultimately, the initiative was dropped, leaving them at the present level, though the government still claims the export taxes will have decreased to 18 % for beans and 15 % for by-products by the end of 2019. The planned tax reduction policy coupled with expectations of further currency devaluations have induced producers and traders to hold onto larger soybean stocks, as they speculate to obtain higher profits from more favourable future market conditions. As a result, Argentina holds at present the world's largest stock of soybean products, with c. 30% of global soy reserves.

The most recent modification adopted towards the export tax policy has been a Presidential Decree installing a new export tax regime, which increases or decreases the tax level in line with the currency exchange rate of the Argentine Peso against the US dollar, up to a maximum established in local currency (PEN 798/2018). "*The new international context, the need to accelerate fiscal consolidation, and the recent currency rate shifts together with their impact over domestic prices made it necessary to temporarily modify the levels of the export duties*", were the arguments justifying the measure. The present values of the export taxes stand at 30 % for beans, 23 % for oil and meal, and 15 % for biodiesel.





As the function of the export tax remains unchanged, the main direct and indirect targets of imposing customs duties on the export of soybean products are still the primary production and exporting sectors. However, the long-term vision of the present administration with regards to the fiscal policy involves relaxing tax impositions and diminishing the relative weight of export taxes as a tool to obtain fiscal revenues, improving the fiscal efficiency of less distortive and more-equitable taxes instead.

### *Broader perspectives on the policy solution*

The application of export taxes on soybean products (and all commodities in general) has been regarded as a confiscatory and illegitimate policy by all soybean agribusinesses, particularly exporters and producers. These have continuously opposed the application of export levies, claiming they lack neutrality as they target specific actors without consideration of production and trade costs. They also state the taxes distort the market and discourage investment, production and exports in farming and the related industries, hindering the productive and commercial potential of the agricultural sector. From their perspective, the State appropriates from a legitimate benefit generated by a competitive sector, in order to redirect it to the promotion of other non-profitable sectors (e.g. subsidies to other industries), excessive public expenditure (e.g. social welfare programmes) and government initiatives guided by policymakers' interests. During the 2008 political and institutional crisis that followed the official mobile export tax initiative, all farming sectors from diverse and even opposing actors (e.g. small-scale farmers *versus* large-scale agribusiness), convened in an unprecedented effort to fight the policy. According to Regunaga (2010), these sectors claimed that "*the recent economic development of Argentina (referring to the 2003-2008 period) has come from the inland territories together with the agricultural sector, and the current recession and economic crisis (referring to the 2008/09 global crisis) is associated more with a lack of growth of the agricultural value chains than from the external global crisis*". The soybean sector tends to support *laissez-faire* and pro-market policy-makers. The recent election of president Macri, heavily supported by the agrarian and exporting sectors and the major media conglomerates, pose as an example of this preference.

On the counter argument, the Government has used the export tax as a legitimate source of fiscal revenue, implemented in a context of economic and social crisis, targeting sectors that obtained extraordinary gains due in great measure to high international prices and steep currency devaluation. During the years following the 2001 crisis, the implementation of the export tax policy was crucial to improve income distribution, offset the impact of price rises upon the national food safety and alleviate social welfare by financing health, education and housing initiatives, critical to the most vulnerable and low-income sectors of society. It has also served to promote value-adding activities, preventing excessive privatisation of the economy.

On its account, the position of the civil society towards the tax policy seemed divided. A significant part braced the claims of the soybean sector, as evidenced by the collective mobilisations during 2008 in support of the agricultural sector's strike. They questioned the justice and legitimacy of the measure, the discretionary character of its implementation and exposed the political interests behind it. Yet, as the crop expanded throughout the country, socio-economic, health and environmental externalities of the soybean model became evident (e.g. economic concentration;





extensive monoculture; land grabbing; displacement of the peasantry and local indigenous people; deforestation, ecosystem degradation; soil depletion; destruction of biodiversity; health impacts due to the more intensive use of agrochemicals, among many others reported). These facts strongly influenced the public's negative perception of the soybean sector and the export tax policy.

A contested aspect regarding the legitimacy of the export duties revolves around the fact that they constitute taxes, and as such the delegation of its imposition of such taxes by the Executive Branch, either through decrees of need and urgency or by exerting legislative entrustments conveyed by the Congress, is against the National Constitution (art. 75 inc.1 CN). Allowing such exemptions in the design and application of taxes endangers the principle of the Division of Powers<sup>37</sup>. This fact seems aggravated by the sub-delegation of the tax application conferred by the Executive Branch in favour of the Minister of Economy (a Federal authority designated by the President). This claimed unconstitutional measure would allow taxpayers (the exporters) to impeach the regulation and reject any payment.

### Summary

The Argentine case raises the question of how to reconcile the promotion and expansion of soybean production, in a context of high international prices and demand, without at the same time endangering local food security and being able to obtain financial resources to implement development policies. In this context, Argentina has become highly vulnerable from the fluctuating and volatile dynamics of commodity prices, which challenge the application of fiscal policymaking. From the strategic viewpoint of production and exports, which are essential for the long-term growth and development of a country, the export tax policy does not appear the ideal fiscal instrument, mainly because of the adverse, disincentivising price distortion effects. Faced with critical socio-economic contexts such as unsolved structural social welfare problems including poverty, indigency and unequal income distribution that prevents social justice, measures such as a soybean export tax can become a critical mean to alleviate pressures in the short-term, as a direct subsidy for food and as an income-transfer tool.

Globally, a large number of developing countries apply export restriction measures, though usually this is done for short periods of time, in contexts of abrupt shifts of relative prices, following currency devaluations or steep increases in high international prices (as was the case for Argentina in 2001/02), and the approach is limited to a few numbers of products. In this sense, the application of export taxes would seem a rather specific measure in emergency contexts and for sensitive crops. In the present context of the global food crisis, the implementation of export taxes, quotas or restrictions has been used by less than a third of the developing countries. Instead, price controls and subsidies to domestic consumption have been the most commonly adopted policies. As such, Argentina has been the only major food exporter to apply retentions to almost all its export commodities, with a high taxation level and for long periods. This has been feasible for soybean since it is not a significant component of local diets and being almost wholly exported the resulting pressure on domestic food prices is not critical compared to other countries that are both large consumers and exporters of soybean products (e.g. Brazil).

<sup>37</sup> This principle states that power must be separated such that sovereignty should be divided between the federal government and regions, states or provinces.





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Altogether, the local experience in the application of export taxes in the context of an unprecedented soybean production boom allows us to reach certain conclusions: (i) the lack of coherent, consensual and structurally planned policy strategies to develop the soybean sector led to the adoption of circumstantial, distortive and conflicting measures; (ii) the export tax policy by itself does not constitute an integral policy solution to convey and direct long-term planning nor successful production strategies within the soybean sector, they must be articulated within reference to broad strategic policy planning; (iii) the implementation of export duties implies legitimacy conflicts which erode its acceptance and application as an income distribution tool, and should be replaced by more efficient and less discretionary taxes; and, (iv) the conflicts arising from the application of export taxes evidence the structural flaw of the Argentine political system to design public initiatives in an institutionalised consensus-oriented way.

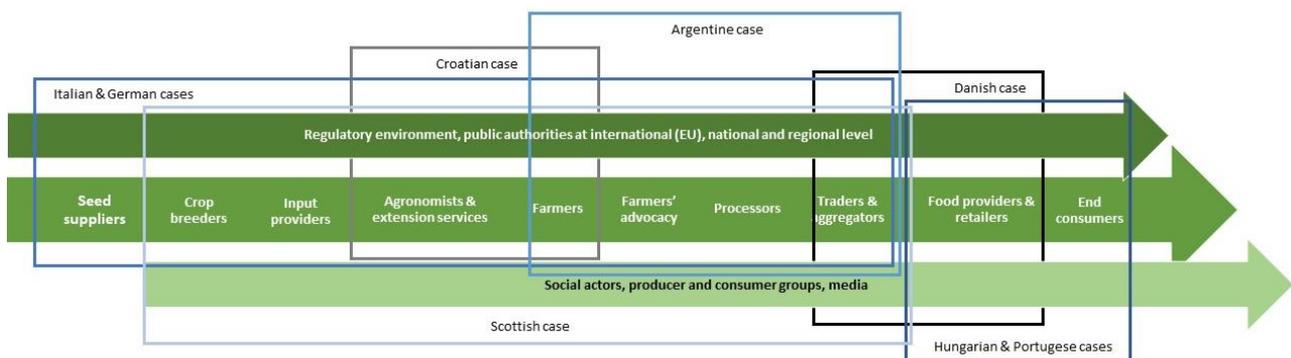
The case study of the export tax policy provides a cautionary tale regarding the structural flaws of the Argentine political system and highlights a description of the circumstantial and short-sighted character of local policymaking towards this critical economic sector. Argentina's economic reliance on soybean exports is paradigmatic of the struggle to obtain robust policy evidence whilst being led to exploit wealth creating businesses and ignoring the substantial negative socio-economic and environmental trade-offs. Debates regarding the convenience and legitimacy of this policy strategy as a fiscal, income distribution and food safety instrument are certain to continue in a country highly dependent on soybean exports. They will most likely intensify in the decades to come, as the South American countries will play, either willingly or not, a vital role as a global animal-feed provider.



## 6. Lessons learnt on policy development and implementation

### 6.1. Who are the agents of change?

The in-depth policy case studies, analysed in this report, focused on different parts of the value chain and examined the role of different types of stakeholders. Some of the case studies had a rather in-depth view on a specific segment of the value chain, analysing targeted policies, stakeholders and the general societal context in more detail (e.g. Denmark, Hungary, Portugal), while others had a wider scope in terms of the value chain, but provided a less detailed understanding of how different stakeholder groups (especially social actors) are impacted by or can influence the relevant policies (e.g. Argentina, Italy, Germany, Scotland). Altogether the analysed cases cover various actors all along the value chain (Figure 8), and in many instances provide insights on how these actors interact with each other to achieve policy transformation.



**Figure 8** TRUE in-depth policy case studies' coverage of diverse actors along the value chain

The rapid stakeholder assessment, prepared as part of the case study analysis, highlighted differences of influence and importance of stakeholders depending on which part of the value chain is the given policy focus. For policies at the consumption endpoint (*i.e.* procurement and nutrition-oriented policies) regulating bodies, consumer groups (e.g. parents association in Portugal), professional organisations (e.g. association of dietetics in Hungary) and processors (*i.e.* catering companies) seem to be the most influential actors, while farmers stand somewhere in the middle, and actors at the lower end of the value chain appear to, or are treated as, if they have much less influence. However, actors at the production endpoint of the value chain (e.g. seed suppliers, crop breeders, agronomists) tend to have an equally important role as actors at the consumption endpoint, as they can have a significant impact on how the increased demand for raw materials or commodities can be met. This gap between actors of importance and influence is well illustrated by the Hungarian case, where the current shift towards more healthy food in public canteens is not accompanied by an increased support to procure locally sourced products. Hence healthy options in public canteens are often offered from cheap imported ingredients. Such gaps in policy support might be covered by the emerging partnership between private actors along the value chain, e.g. one of the biggest public caterers in Hungary, started a joint product development with large processor companies who process raw material of Hungarian origin.



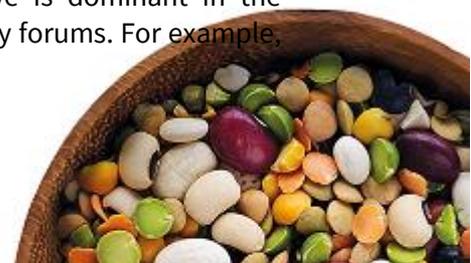
Case studies analysing policies that focus more at the production (and processing) segments of the value chain indicates that processors and agronomists are equally important and influential players as farmers themselves and state regulators, while crop breeders, seed suppliers or civil society are seen to play less relevant roles. However, in situations where existing and widely used breeds are not profitable enough, crop breeders and seed suppliers would be key actors, and support for research and innovation could highly contribute to an increased volume of legume production. In some cases, multi-actor networks including farmers, advisors and breeders fill such gaps (e.g. in Germany) while in other situations one or a few market actors fill this niche and provide novel breeds as well as technical knowledge to farmers (e.g. in Italy).

A general finding of the analysis is that international trade policy has a considerable influence on legume production and consumption, but which is more distant from regular actors of the value chain, *i.e.* it is mainly the state which can influence trade policies. Regulatory bodies at regional, national and EU level are highly influential in terms of designing policy instruments and providing financial incentives. Farmers are also key actors of the legume value chain with respect to both their importance and influence, although further differentiation is necessary to understand the different and often opposing views and needs of large-scale, intensive producers and smaller-scale farmers and processors. A small number of large companies (often conglomerates) seem to push the agri-food system towards large-scale operations to decrease import dependence and meet the protein demand of the animal feed sector. However, emerging partnerships and networks between various actors of the value chain, as well as bottom-up initiatives of societal actors create space for innovation both in legume production and processing, and can push regulatory changes as well, especially if backed by social actors and the media. Therefore, when looking for the real change, agents of sustainability transformation are niche market innovators, formal and informal networks between seed suppliers, farmers and processors, as well as NGOs and civil associations. All should be considered as key actors.

## 6.2. What are the most legitimate narratives?

The analysis highlighted four dominant narratives to support a transition to more sustainable legume-based systems in Europe, as follows:

- **Improve European self-sufficiency of plant protein sources:** this is a strong narrative at EU and national level, having a direct focus on agriculture and trade. However, this narrative can be perceived as a continuation of the *status quo* regarding the press for animal feed, large-scale agriculture, and mainly soybean production.
- **Improve health and nutrition status of European citizens, contribute to a sustainable shift in food consumption:** this is a widely accepted argument both at the EU and national levels, with the potential of unifying diverse stakeholders (policy makers, producers, food providers, consumers). However, with the exception of a few cases, legumes are not in the centre of this narrative, and their exact role is still debated.
- **Combating biodiversity loss and climate change:** this narrative is dominant in the scientific dialogue and well presented in international science-policy forums. For example,



the IPBES's recent assessment on land degradation<sup>38</sup> explicitly mentions the importance of cover crops, green manures and intercropping as viable strategies for combating land degradation and contributing to climate mitigation. EU level policies (especially CAP) allows for member states to accommodate this narrative as part of the greening measures, although it is less visible at lower scales and rarely drive individual choices (either of producers or consumers).

- **Improving opportunity for knowledge sharing:** several actors acknowledge this narrative at different scales as a critical factor of legume production, and open doors for private initiatives and innovations.

### 6.3. Which factors limit and enable policy change for sustainable legume-based systems?

The policy analysis at the EU and national level reinforced the key challenges identified in preceding LIN meetings, that are the knowledge gaps and lack of awareness of the benefits of legumes; technological lock-ins and economic limitations regarding legume production; fragmentation (and sometimes contradictory measures) in relevant policy fields; and, disintegration along the value chain. The analysis of case studies allowed us to go one step further by pointing at several enablers that support the sustainability transformation of legume production and consumption in Europe. Major policy pathways for sustainable legume-based systems are listed in Table 9, including references to those in-depth policy case studies which demonstrate how such approaches have been set up and function. Whether and how far these solutions have a real positive impact on the level of legume production, and consumption is difficult to judge in some cases due to the relatively short implementation period of the policy. Follow-up studies are therefore required to assess the effectiveness of these (and other) policy solutions.

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<sup>38</sup> [Land degradation and restoration \(IPBES assessment\)](#)



**Table 9** Barriers, enablers and policy pathways for sustainable legume-based systems, identified in the TRUE policy case studies

Barriers	Enablers	Sustainable policy pathways	Reference case(s)
<b>Lack of knowledge and awareness among producers and consumers</b>	Legitimate narratives for more legumes (environment, climate, health, nutrition) and increasing media coverage of such topics	Knowledge transfer <i>via</i> multi-actor collaborations, public support for increased accessibility of best available knowledge	Germany, Hungary, Croatia
<b>Technological lock-ins, lack of suitable breeds</b>	Innovations led by the private sector, emerging networks for sharing know-how	Public-private partnerships, public funds to support (grassroots) innovation and experimentation with traditional breeds	Germany, Italy, Scotland
<b>Limited profitability of legume production</b>	Financial gains <i>via</i> improved soil quality and reduced fertiliser use	Support intercropping, couple CAP payments with national funds for legume production or restrictions on nitrogen use	Germany, Italy
<b>Limited profitability of legume production</b>	By advocating for legumes, farmers and companies can present themselves as acting on health and environmental problems and might realise price premiums	Certification and labelling for producers who maintain environmental and social services to prioritise in subsidy and procurement systems, better acknowledge the ecological functions of legumes	Denmark, Germany
<b>Unfavourable trade structure, import dependency concerning plant protein sources</b>	High demand for GMO-free products, more credibility attributed to products of regional/traditional origin	Integrate health and nutrition aspects in food and agricultural policies, encourage the consumption of locally sourced pulses <i>via</i> public catering, focus support on niche market segments	Portugal, Italy, Scotland
<b>Disintegration along the value chain, the distance between the key players</b>	Emerging networks of legume producers, grassroots initiatives to support farm-to-table solutions	Focus on agri-ecological approaches, support alternative agri-food systems in legume production	Scotland





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A general lesson learnt from these diverse pathways is the critical role of **networking and collaboration**, which in many cases includes multiple actors (*i.e.* farmers, input providers, NGOs and professional advocacy groups and consumers), and backs knowledge creation and innovation processes, as well as the integration across the value chain. In-depth policy case studies also highlighted the fact that fragmentation and inconsistency of existing policies create situations where actors of the value chain face different incentives. **Policy integration** – linking environment, climate, health and nutrition aspects within agriculture and food policies, and eliminating inconsistencies – would allow for a more comprehensive incentive system where legumes could gain a pivotal role by acknowledging the various benefits they offer to humans and the environment.

Some of the in-depth policy case studies also highlighted that existing power structures, rigid regulatory systems and slowly changing cultures or particular business, governance or governmental logics result in path-dependency, *i.e.* innovative policy solutions are difficult to implement. Instead, incremental policy changes are favoured which have, however, slower and less visible impacts on legume production and consumption. Governance solutions shaping legume production and consumption in Europe are inherently multi-level. There is a strong interplay between the EU and the member states for agricultural policies (CAP greening + voluntary coupled support), and an increasing collaboration for production and trade within the EU (including a stronger coordination to represent the European market in international dialogues, as pinpointed by the Donau Soya initiative and recent dialogue with *e.g.* Chinese actors). On the other hand, food and nutrition-oriented policies are less centralised, this policy field is characterised by diverse solutions at the national or regional level and an increased openness for knowledge exchange on best practices. In addition to the multi-level nature of relevant policies, a multi-actor governance approach seems to emerge, characterised by private and societal actors playing a role in policy formulation and development of bottom-up governance solutions.



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## 7. Policy prospects for a transition to a legume-based system

Recently, policy analysts claimed that no single simple policy change could alter the current low status of legume cultivation in Europe (Topp *et al.*, 2014). A suite of policy innovations is required to circumvent technological lock-in, to promote legumes, increase their commercial competitiveness and move towards more sustainable food security. The Final Report of the European Innovation Partnership (EIP)-AGRI Focus Group on *Protein Crops* (Schreuder and De Visser, 2014) contended that a step-by-step approach would be desirable in an attempt to increase Europe's self-sufficiency of protein crop production. The report correctly underlined the creation of knowledge arenas between farmers, advisors and researchers to improve shared understanding of legume-based farming systems.

Previous projects such as [Legumes Futures](#) and [Legato](#) also demonstrated that there is a lack of understanding of long-term benefits *versus* short-term gains regarding policy change. However, the primary challenges were presented as the high interannual yield variability of legumes, and the lack of knowledge exchange among stakeholders that could lead to a shared understanding of pathways to sustainability. Any development is much dependent on coordinated, complementary policy measures rooted in an understanding of the agroecological processes governing the benefits.

Bottom-up (consumer) food policy initiatives, free from the routines and lock-ins of the dominant system, are drivers of a transition towards more sustainable food systems and thus are relevant locations for looking at transition pathways towards legume-based systems. Local and short value chains are directly confronted with a policy bias toward large-scale, conventional agri-food systems. Bottom-up initiatives may collectively engage influential and less powerful actors of the agri-food system spanning businesses, public sector researchers, policymakers and the public. Aligned with the principles of agroecology globally, numerous institutions and innovations aimed to integrate local production, processing and access ('local and regional food systems') have already been created, though a database or cooperative of such facilities remains to be established at the various scales. Initiatives that are drawing attention to the dysfunctions of the food market or malign production and consumption patterns can also provide and motivate legume-based alternatives.

Community supported agriculture *via* short, values- or place-based supply chains are building on the growing interest of consumers and producers to encourage local craft-scale production produced and processing. This "*new ethical foodscape*", has a limited outreach and is presently more appealing to already privileged social groups. Nevertheless, these niche markets with higher added value maintain an economically attractive space for producers and consumers which help transitions happen. Also, such activities serve a relevant social, educational provision, increasing the awareness of consumers more generally and this cascades to the expectations of the affected consumers when purchasing food from more-commercially dominant retailers. The increasingly recognised ecological and economic pressures on agroecosystems might further push legumes into a significant position. Furthermore, several small-scale policy initiatives can help the maintenance of these initiatives and support the availability of nutrient-rich foods. Also, some support for the promotion of new value chains for innovative foods has become more available in recent years.



Where they exist, local and national level policies which support (locally grown) legume-based food production have failed to increase legume-based diets. More efficient policy innovations are urgently required to realise sustainable protein production. Some of the progressive examples include (from TRUE Case Studies and work package activities) the following.

- Mandatory inclusion of a vegetarian option in every public canteen, started in June 2017 (Portugal)<sup>39</sup>.
- Addition of a separate section for legume grains in our food pyramid (wheel) (Portugal)<sup>40</sup>.
- Creation of a legume-focused recipe book, using species from across Europe, with Slow Food (Germany), 2020.
- Use of pulses to in fermentation-based industries (biorefining), such as to brew beer (as showcased at the [Edinburgh Science Festival](#), and neutral spirits<sup>41</sup> (United Kingdom). This is linked to developing high-protein the co-products for use in food and feeds (c.f. [Beans4feeds Project Reports](#): Germany and the United Kingdom).
- Using home-grown, Scottish, faba bean to make “ScoFu”, or “Scottish tofu” (UK)<sup>42</sup>.

There are numerous other initiatives as highlighted from other EU projects such as [Protein2Food](#). As numerous socially innovative companies such as [Hodmedods](#) – Britain’s Pulse & Grain Pioneers: a UK producer and processor operating *via* a short-supply chain to sell a range of top-quality ingredients and delicious foods (fava bean, black badger peas) from British farms, and they are also breeding novel legume types legumes for their market too (which now extends at least Europe-wide).

The post-2020 Common Agricultural Policy is expected to provide new opportunities for various actors engaging in legume-based systems, primarily to meet its objectives on climate change and the environment (*i.e.* the eco-schemes and the support of crop rotation instead of crop diversification measures via simple legume- (or protein-) crop inclusion<sup>43</sup>). A recent study – reviewing 165 papers, both white and grey, which provide recommendations to the CAP – acknowledges the current attempts to incorporate environmental and climate measures in agricultural policy but urges further integration along the agri-food system whilst considering the various aspects of health and nutrition in the future CAP (Recanati *et al.*, 2019 and Figure 9).

<sup>39</sup> [Menu Vegetariano Obrigatorio \(SNS GOV\)](#)

<sup>40</sup> [Roda dos alimentos mediterrânica \(alimentacaosaudavel\)](#)

<sup>41</sup> [Beans4feeds](#)

<sup>42</sup> [Living Field](#)

<sup>43</sup> [Future Cap \(EC\)](#)



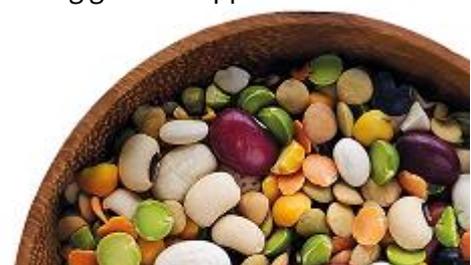


**Figure 9** The CAP today and beyond 2020, according to scientific recommendations (published by Recanati *et al.* 2019)

Such an integrated approach in the upcoming CAP is highly supported by advocacy groups of small-scale farmers, such as [AbL](#), which recommends a point system to couple the agricultural payments to social and ecological services based on the information all farmers already need to provide when they apply for support. According to the AbL’s proposal, legume production could be one specific requirement of receiving the funds, leading to increased nitrogen fixation, better soil qualities and savings in fertiliser use (AbL, 2018). Redirecting CAP payments for integrated agricultural practices (e.g. intercropping and reduce agri-chemical use/dependency) which enable legume production to support the yield of non-leguminous crops *via* improved ecological functions could lead to environmental, social and economic gains. Such a shift is, however, difficult to realise as interest-based conflicts with large-scale producers might emerge.

We conclude that there is an increasing need for an active and transparent science-policy interface to support legume-based agri-food systems. The EU-H2020 funded project [TRUE](#) (TRansition paths to sUustainable legume-based systems in Europe,) aims to enable co-innovative environments to help realise policies which will adequately support current and future, food and nutritional security challenges *via* the greater use of legumes and legume-based products. Also, it must be realised that transition is required throughout the agri-food chain and simultaneously in collective action. That is, it is highly unlikely that a single intervention will prove sufficient to realise agri-food systems which can harmonise all three pillars of sustainability<sup>44</sup>. That is, price support or other economic incentives will not counterbalance the (apparent) low profitability of legumes. Magrini *et al.* (2016) suggested the creation of new socio-technical innovations to foster cropping-system diversification. This suggestion needs to be extended specifically to legume-based products generated and consumed by all sectors of provenanced agri-food systems. Furthermore, it is argued that both state and non-state actors should be mobilised to engage in such cooperative purposive transition. Such engagement would represent new standards in sustainable-business logic and models, and may be desirable with respect to four key priority actions: improve knowledge across the value chain in managing rotations with legumes and especially: using less mineral fertiliser to support natural nitrogen (and carbon) cycling; developing accounting tools to better assess the ecological benefits of legumes in monetary terms; ensuring supply chain capacities and food innovations at the local or regional scales to develop new outlets for grain and forage legumes; and, providing greater support

<sup>44</sup> *i.e.* a seemingly simple solution to a complex and interrelated issues.





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for initiatives which aim to improve breeding of more legume species and for local-pedoclimates, and to increase existing cultivar options legumes.

Also, legumes require an enabling policy environment to meet current and future food and nutritional and health security challenges. Understanding policy constraints are the first step in engaging multiple stakeholders and decision-makers in the creation of a more favourable policy and governance context. Therefore, a wide range of interested parties such as farmers, advisors, breeding businesses, non-governmental organisations, and including both the conventional and the organic sector, require representation within a science-society-policy interface to be established by the TRUE project.

New methodologies of policy analysis could help build on the four-step codesign-framework to enable the following. **(1) Co-design, via elaboration of the *research agenda*, identifying societal and scientific research needs.** We invite a range of stakeholders, beyond the partners, to Legume Innovation Network workshops to incorporate a wide variety of knowledge areas. Co-design is understood as a joint creation with these stakeholders of targeted outputs, processes, aims and structures of collaboration. **(2) Co-production of *joint knowledge generation at various levels*.** Data and information will be collected during field and site visits to inform real-world perspectives and to inform decisions on sustainable solutions. Joint interpretation of results will be undertaken by different actors to identify different value systems. Co-production will encourage the analysis at regional and national levels and policy interviews at the EU level will be documented including joint reports, publications, conferences and socio-technical innovations. **(3) Co-creation of new *governance solutions*.** A Delphi survey will be carried out with a broad range of stakeholders. Co-creation is an overarching concept, implying the application of various types of collaboration processes among scientific and non-scientific actors toward the creation of new knowledge and practices aligned with responsible research and innovation. **(4) Co-dissemination and *synthesis reflection workshops*.** Co-dissemination here refers to our continuous effort to invite stakeholders to joint synthesis exercises. Aims are to facilitate the validation, application and reception of the results, and to decide how results are implemented.



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## Annex I. Data collection template to create an online repository of existing policy solutions

Exact title of policy/instrument:	
<b>National language:</b>	Nemzeti fehérje takarmány programme
<b>English:</b>	National protein feed programme

Description:	
<b>Decision-making body of policy:</b>	Government of Hungary
<b>Type of legal document:</b>	Government decree, Ministry of Agriculture
<b>Scale (int.-EU-nat.-reg.-loc.)</b>	National
<b>Focus</b>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Food/feed innovation – social/market and technological aspects (e.g. new raw materials)</li> <li><input checked="" type="checkbox"/> food/feed research</li> <li><input type="checkbox"/> CAP and agricultural economy (land use, rural development, organic farming, internal production market)</li> <li><input type="checkbox"/> Health policies</li> <li><input type="checkbox"/> Consumption policies promoting sustainable food/diet</li> <li><input type="checkbox"/> Climate policy</li> <li><input type="checkbox"/> Water, Soil, Environment (pesticide use)</li> <li><input type="checkbox"/> Habitats and biodiversity policies</li> <li><input type="checkbox"/> Rest of the world (trade agreements, development aid)</li> <li><input type="checkbox"/> other: .....</li> </ul>
<b>coming into effect:</b>	Oct 2017

Policy objective:
replace feed from genetically modified soybean imports

Relevance and importance for TRUE:
<p>Goals to support a legume-based transition...</p> <ul style="list-style-type: none"> <li>• What is the policy problem that needs an urgent solution? Substitute GMO soy from feed</li> <li>• Who are the policy decision-makers? Members of Parliament</li> <li>• How to create actionable, reliable policy-relevant knowledge? part of a three-year 8 billion HUF research and development plan</li> </ul>



## Annex II. Detailed guidance for the in-depth policy analysis

We structured the policy analysis process into a simple, 8-step procedure which combines desk research, document analysis and interviewing as the main data collection methods. The estimated time needed to carry out the analysis for one policy solution is 12-15 expert days altogether. The outcomes of the analysis will be a ‘story’ which describes how policy frames the situation of pulses, what policy content targets (and whether and how it enables or limits) the production and consumption of pulses, and how the policy is perceived by other actors. The research reports will be further analysed by ESSRG to bring them together in one common deliverable and draw some general lessons (D7.2).

Steps	Research question(s)	Task	Method	Estimated time	Special skills/resources
<b>Delineate the case study</b>	Which policy/governance solution is the subject of your analysis?	Describe shortly the unit of the analysis (which policy sector, which legal/policy documents are at the centre of your analysis).	Expert justification	0.5 day	---
<b>Unfold key challenges</b>	Which policy challenges are targeted by the policy/governance solution of your case?	Check results from D7.1 on the key policy challenges, and indicate which ones are the most relevant in your specific case.	Expert justification	0.5 day	Summary of key policy challenges (incl. LIN meetings).
<b>Identify and collect key documents</b>	Which legal and strategic documents play a key role in your case study?	Collect relevant legal and strategic policy documents (laws, decrees, strategies, recommendations) which have officially been published as part of the analysed policy solution.	Desk research based on online searches	1 day	---
<b>Preliminary document analysis</b>	How do key legal and strategic policy documents frame the issue?	Analyse the policy content by answering: - Which goals are identified? Do	Document analysis based on searching for key	2-4 days (avg. 1 day per policy document)	Analytical skills, using a qualitative data



Steps	Research question(s)	Task	Method	Estimated time	Special skills/resources
		<p>these goals echoes the policy challenges selected before? How?</p> <ul style="list-style-type: none"> <li>- Who are the target groups? Are there competing value framings or conflicting interests reflected by the documents concerning the production and consumption of pulses?</li> <li>- Which instruments are suggested by the documents concerning the production and consumption of pulses?</li> </ul>	terms and analysing the textual context		analysis software might reduce the time required
<b>Secondary data collection</b>	Which scientific and public narratives are relevant in your case?	Collect white and grey literature as well as media releases about how the above policy documents were designed, consulted, implemented, and how they are perceived by different stakeholder groups.	Desk research based on online searches	1-2 days altogether	---
<b>Secondary data analysis</b>	How can the policy process be characterised based on the	Identify conflicting value framings, argumentations and gaps in your	Document and media analysis done in		Analytical skills

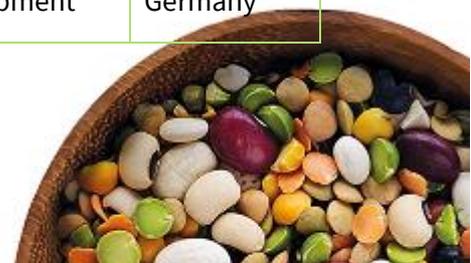


Steps	Research question(s)	Task	Method	Estimated time	Special skills/resources
	scientific and public discourse?	'story'. Identify key actors who might have an in-depth view of the policy context and process.	parallel with the search		
<b>Corroborate preliminary results</b>	How do key stakeholders perceive and evaluate the policy solution?	Fill the gaps in your 'story' concerning the policy context and the policy process. Pay attention to the following questions: <ul style="list-style-type: none"> <li>- How do the interviewees evaluate the policy solution?</li> <li>- Which values do they refer to, and which arguments do they use? Are there any conflicts between these?</li> <li>- Who are the powerful actors, who are the knowledge holders? How could these actors influence the policy process and the content?</li> </ul>	4-6 key informant interviews (phone or face-to-face). Analysis should be based on searching the key-terms and checking their textual context.	4-6 days (including the interview and its analysis)	Expertise in qualitative social scientific methods is an added value. Using a qualitative data analysis software might reduce the time required. The standard interview guide from D7.1 can be used.
<b>Write the 'story'</b>	How does policy enable or limit the production and consumption of pulses?	Write a 6-8 pages long report that tells the story of your case.	Summary of earlier research results	2 days	Use the common reporting structure



## Annex III. The list of policy documents analysed in D7.2

Title of the policy document	Relevant policy field	Country
Blair House Agreement and the Memorandum of Understanding on Oilseeds	Trade and agriculture	International
EU Common Agricultural Policy (including EAFRD)	Agriculture	EU
EU Green Public Procurement	Health and nutrition	EU
EU 7 <sup>th</sup> Environmental Action Programme	Environment	EU
European Food and Nutrition Action Plan	Health and nutrition	EU
EU Protein Strategy	Agriculture	EU
EU Soy Declaration	Agriculture	EU
Law on Croatian Agricultural and Forestry Advisory Services	Agriculture and advisory	Croatia
Statute of the Croatian Agricultural and Forestry Advisory Services	Agriculture and advisory	Croatia
Strategic Plan of Work for Period 2018–2020 of the Croatian Agricultural and Forestry Advisory Services	Agriculture and advisory	Croatia
Technological instructions for integrated production of field crops in Croatia	Agriculture and advisory	Croatia
Customs Code	Trade	Argentina
PD 310/2002.	Trade	Argentina
PD 310/2002.	Trade	Argentina
MEI 11/2002	Trade	Argentina
ME 35/2002	Trade	Argentina
MEP 10/2007	Trade	Argentina
MEP 369/2007	Trade	Argentina
PEN 509/2007	Trade	Argentina
MEP 125/2008	Trade	Argentina
PEN 206/09	Trade	Argentina
PEN 133/2015	Trade	Argentina
PEN 1343 / 2016	Trade	Argentina
MA-AFIP 3993-E/2017	Trade	Argentina
PEN 1025/2017	Trade	Argentina
PEN 486/2018	Trade	Argentina
PEN 793/2018	Trade	Argentina
Implementation of CAP 2nd pillar measures (EAFRD) in 14 Federal States of Germany	Rural development	Germany



Title of the policy document	Relevant policy field	Country
German Protein Crop Strategy	Agriculture	Germany
GAK Master Plan	Agriculture	Germany
Organic Eating Label	Health and nutrition	Denmark
1/2011 Normative Instructions and Recommendation by the Chief Medical Officer of State	Health and nutrition	Hungary
37/2014 Decree of the Ministry of Human Resources on Public Food Procurement	Health and nutrition	Hungary
36/2016 Amending Regulation or the 37/2014 Decree of the Ministry of Human Resources on Public Food Procurement	Health and nutrition	Hungary
Circular 3/2013: Orientações sobre ementas e refeitórios escolares (Guidelines on menus and school cafeterias)	Health and nutrition	Portugal
“Orientações sobre ementas e refeitórios escolares” (Guidelines on menus and school cafeterias), July 2018 – New update to Circular 3/2013	Health and nutrition	Portugal
Lei 11/ 2017: Estabelece a obrigatoriedade de existência de opção vegetariana nas ementas das cantinas e refeitórios públicos (Law that establishes the mandatory existence of vegetarian option in the menus of canteens and public cafeterias).	Health and nutrition	Portugal





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## Annex III. Background to the TRUE project

### Executive Summary - Abbreviated

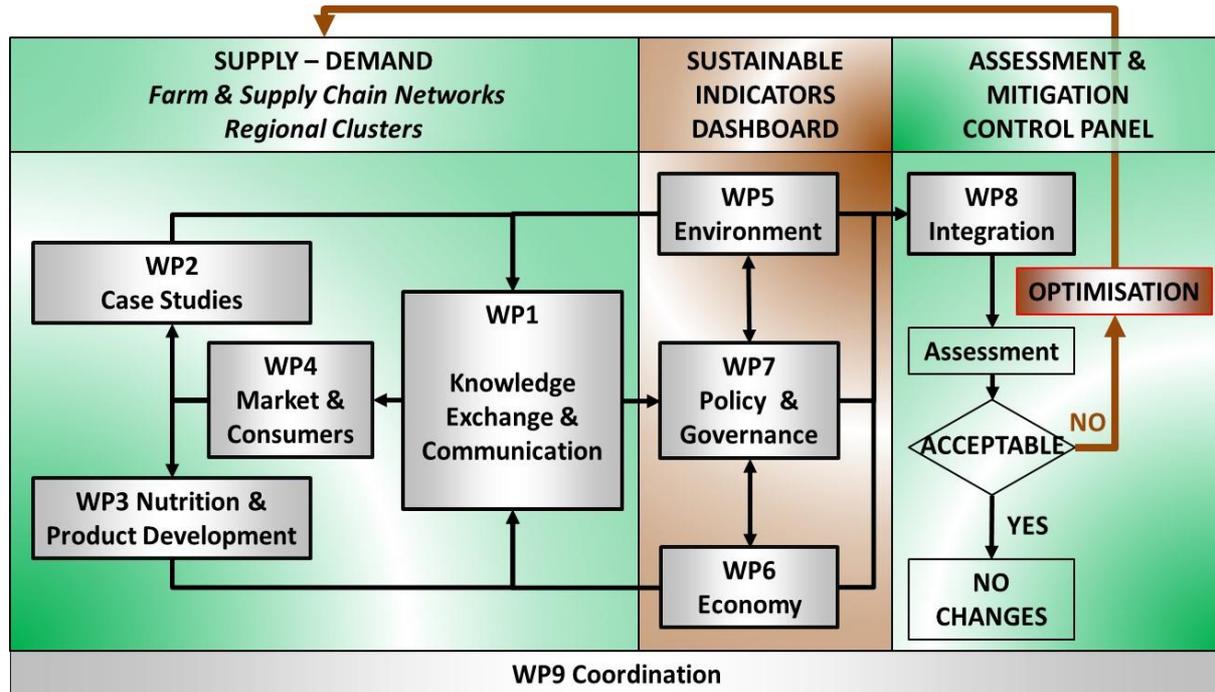
TRUE's perspective is that the scientific knowledge, capacities and societal desire for legume supported systems exist, but that practical co-innovation to realise transition paths have yet to be achieved. TRUE presents 9 Work Packages (WPs), supported by a *Intercontinental Scientific Advisory Board*. Collectively, these elements present a strategic and gender balanced work-plan through which the role of legumes in determining 'three pillars of sustainability' – 'environment', 'economics' and 'society' – may be best resolved.

TRUE realises a genuine multi-actor approach, the basis for which are three *Regional Clusters* managed by WP1 ('*Knowledge Exchange and Communication*', University of Hohenheim, Germany), that span the main pedo-climatic regions of Europe, designated here as: *Continental*, *Mediterranean* and *Atlantic*, and facilitate the alignment of stakeholders' knowledge across a suite of 24 Case Studies. The Case Studies are managed by partners within WPs 2-4 comprising '*Case Studies*' (incorporating the project database and *Data Management Plan*), '*Nutrition and Product Development*', and '*Markets and Consumers*'. These are led by the Agricultural University of Athens (Greece), Universidade Catolica Portuguesa (Portugal) and the Institute for Food Studies & Agro Industrial Development (Denmark), respectively. This combination of reflective dialogue (WP1), and novel legume-based approaches (WP2-4) will supply hitherto unparalleled datasets for the '*sustainability WPs*', WPs 5-7 for '*Environment*', '*Economics*' and '*Policy and Governance*'. These are led by greenhouse gas specialists at Trinity College Dublin (Ireland; in close partnership with Life Cycle Analysis specialists at Bangor University, UK), Scotland's Rural College (in close partnership with University of Hohenheim), and the Environmental and Social Science Research Group (Hungary), in association with Coventry University, UK), respectively. These *Pillar WPs* use progressive statistical, mathematical and policy modelling approaches to characterise current legume supported systems and identify those management strategies which may achieve sustainable states. A *key feature* is that TRUE will identify key *Sustainable Development Indicators* (SDIs) for legume-supported systems, and thresholds (or goals) to which each SDI should aim. Data from the *foundation WPs* (1-4), to and between the *Pillar WPs* (5-7), will be resolved by WP8, '*Transition Design*', using machine-learning approaches (e.g. *Knowledge Discovery in Databases*), allied with *DEX* (*Decision Expert*) methodology to enable the mapping of existing knowledge and experiences. Co-ordination is managed by a team of highly experienced senior staff and project managers based in The Agroecology Group, a Sub-group of Ecological Sciences within The James Hutton Institute.



**Work Package Structure - Diagram**

Flow of information and knowledge in TRUE, from definition of the 24 case studies (left), quantification of sustainability (centre) and synthesis and decision support (right).



**Project Partners - Table**

No	Participant organisation name (and acronym)	Country	Organisation Type
1 (C*)	The James Hutton Institute (JHI)	UK	RTO
2	Coventry University (CU)	UK	University
3	Stockbridge Technology Centre (STC)	UK	SME
4	Scotland's Rural College (SRUC)	UK	HEI
5	Kenya Forestry Research Institute (KEFRI)	Kenya	RTO
6	Universidade Catolica Portuguesa (UCP)	Portugal	University
7	Universitaet Hohenheim (UHOH)	Germany	University
8	Agricultural University of Athens (AUA)	Greece	University
9	IFAU APS (IFAU)	Denmark	SME
10	Regionalna Razvojna Agencija Medimurje (REDEA)	Croatia	Development Agency
11	Bangor University (BU)	UK	University
12	Trinity College Dublin (TCD)	Ireland	University
13	Processors and Growers Research Organisation (PGRO)	UK	SME
14	Institut Jozef Stefan (JSI)	Slovenia	HEI
15	IGV Institut Fur Getreideverarbeitung Gmbh (IGV)	Germany	Commercial SME
16	ESSRG Kft (ESSRG)	Hungary	SME
17	Agri Kulti Kft (AK)	Hungary	SME
18	Alfred-Wegener-Institut (AWI)	Germany	RTO
19	Slow Food Deutschland e.V. (SF)	Germany	Social Enterprise
20	Arbikie Distilling Ltd (ADL)	UK	SME
21	Agriculture And Food Development Authority (TEAG)	Ireland	RTO
22	Sociedade Agrícola do Freixo do Meio, Lda (FDM)	Portugal	SME
23	Eurest -Sociedade Europeia De Restaurantes Lda (EUR)	Portugal	Commercial Enterprise
24	Solintagro SL (SOL)	Spain	SME

\*Coordinating institution





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*Objectives - Abbreviated*

**Objective 1: Facilitate knowledge exchange (UHOH, WP1)**

- *Develop a blue-print for co-production of knowledge*

**Objective 2: Identify factors that contribute to successful transitions (AUA, WP2)**

- *Relevant and meaningful Sustainable Development Indicators (SDIs)*

**Objective 3: Develop novel food and non-food uses (UCP, WP3)**

- *Develop appropriate food and feed products for regions/cropping systems*

**Objective 4: Investigate international markets and trade (IFAU, WP4)**

- *Publish guidelines of legume consumption for employment and economic growth*
- *EU infrastructure-map for processing and trading*

**Objective 5: Inventory data on environmental intensity of production (TCD, WP5)**

- *Life Cycle Analyses (LCA) -novel legumes rotations and diet change*

**Objective 6: Economic performance - different cropping systems (SRUC & UHOH, WP6)**

- *Accounting yield and price risks of legume-based cropping systems*

**Objective 7: Enable policies, legislation and regulatory systems (ESSRG, WP7)**

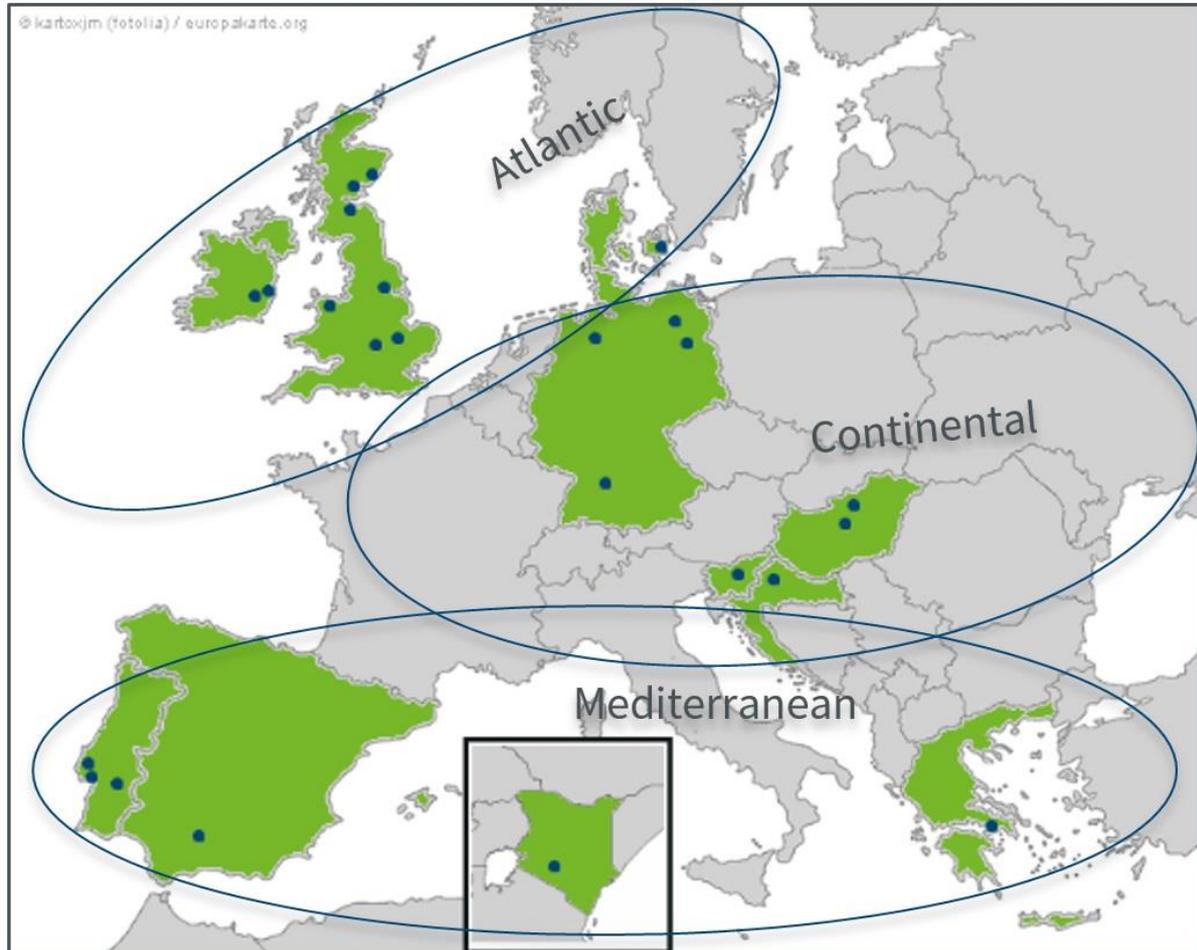
- *EU-policy linkages (on nutrition) to inform product development/uptake*

**Objective 8: Develop decision support tools: growers to policy makers (JSI, WP8)**

- *User friendly decision support tools to harmonise sustainability pillars*



*Regional Cluster & Case Studies – Diagrams*



Knowledge Exchange and Communication (WP1) events include three TRUE European Legume Innovation Networks (ELINs) and these engage multi-stakeholders in a series of focused workshops. The ELINs span three major pedoclimatic regions of Europe, illustrated above within the ellipsoids for Continental, Mediterranean and Atlantic zones.

