

116 Danish municipalities support to the cultivation and consumption of legumes through public procurement strategies

Rikke Lybæk¹, Henrik Hauggaard-Nielsen²

^{1,2}Roskilde University, Department of People and Technology, Universitetsvej 1, 4000 Roskilde, P.O. Box 260, Denmark.

¹E-mail: rbl@ruc.dk; Phone: (+45) 52402686

Abstract

This paper will, with point of departure in the situation in Denmark, investigate how to speed up the use of grain legumes within the municipal food basket, applying the theoretical approach of municipalities being ‘consumers’, ‘regulators’ and ‘facilitators’. Through public procurement strategies (‘regulator’), Danish municipalities have previously for example requested the use of organic food produce within municipal kitchens (kindergartens, elder people’s homes, etc.), and hereby been an important user and pull-market (‘consumer’) agent for an increase in organic food produce. Grain legumes like fababeans, lentils, peas and chickpeas have traditionally been a part of our diet, as being a healthy inexpensive source of protein, substituting for example meat produce, while playing an important role in the traditional crop rotation systems providing Eco System Services (ESS). Within the EU, political focus is currently on the cultivation of grain legumes for both animal fodder and human food, with the purpose of substituting imports of soy for livestock feed and increasing direct human food plant protein consumption. Various organizations are engaged in this transition including grain legume suppliers, retail markets and citizens. Presently, the market for domesticated grain legumes is developing fast. Through the theoretical lens described above - combined with case study analysis of four Danish municipalities, as well as a chickpea producer and a legume retailer both seeking a market entry - we will analyze how Danish municipalities can be important actors in developing a market for grain legumes. We find that especially larger Danish municipalities are very active within the area, having developed politically decided municipal food and meal strategies that includes grain legumes, where some even require supply of locally produced grain legumes. Others again, are merely starting up emphasizing grain legumes in their municipal food supply, but have on the other hand, supported (‘facilitated’) business cooperation between a grain legume producer and retailer within the local community. Thus, the analysis reveals the current patterns of support from municipalities, provided by the cases, but also reflect on the future not yet harvested support mechanisms.

Keywords: Agriculture, case study, legumes, municipalities, public procurement

Introduction

Global decline in legume cultivation

The development of more EU-grown plant proteins is required to meet the farm to fork's strategy objectives. Countries in the developed world are consuming unfavorable amounts of animal proteins primarily based on imports causing environmental and social challenges (FAO, 2018). Natural and semi-natural habitats are consequently and increasingly being converted into arable land, with severe impact on soil quality, climate change and biodiversity (Nemecek et. al., 2008). Denmark imports around 1.8 million ton of fodder protein annually, where 80 % is utilized for pig fodder, and the remaining as feed for dairy cattle, poultry and egg producing hens (IFRO, 2012; 2014). Over the last five decades the global average grain yield has almost doubled, but the cultivation of legumes dramatically declined - for fababean with about 56 % (Jensen et. al. 2010). This means reduced Eco system Services (ESS) beyond protein quality provided (Jensen, et. al. 2010; Zander et. al. 2016).

Consumption of legumes in Denmark

After years of decline in the consumption of legumes within the EU and globally, as mentioned above, it now seems that the development is slowly changing in a Danish context. Livestock farmers are increasingly utilizing e.g., fababeans as animal fodder, especially within organic farming, and a market for leguminous produce for human food are being requested by supermarkets and thus consumers (Landbrugsavisen.dk, 2020; Økologisk Landsforening, 2021a). By 2050 it is estimated that approximately 50.000 and 100.000 ha cultivated farmland in Denmark will be composed of legumes for human food and animal fodder respectively, and that the farmland area dedicated to cultivation of animal fodder will be reduced from 1.77 million ha to 1.22 million ha within the same period (Rådet for Grøn Omstilling, 2020). Fewer livestock, and livestock feed by e.g., grass clover and proteins extracted from grass clover, will be some of the means to reach this. Increases in consumption of legumes for human food are not only based on traditional legumes being costumed to the Danish climate, where pea for example is popular (Landbrugsavisen.dk, 2020b). Also, lenses, chickpea and lupine are requested by consumers, and many stakeholders would like to support a local market where these types of legumes not are based on import (Landbrugsavisen.dk, 2020a).

Within some Danish municipalities legumes have also become popular, and some such local governments are now including legumes in their Public Procurement (PP) strategies, as they included organic produce some 20 years ago (Sørensen et. al., 2016; Smith et. al., 2016). Legumes are a more climate friendly and protein rich substitution to the consumption of e.g., meat, and many municipal kitchens would like to utilize new types of protein sources (Møller, 2021; Petersen, 2021; Dahl, 2021). But how is the purchase of legumes being

supported within municipalities, and what type of legumes are being requested? How are municipalities developing tools and support mechanism to be able to select specific locally cultivated sorts of legumes instead of legume imports? And which barriers and opportunities exist within the supply part of the value chain to be able to deliver the legumes requested in the municipal food basket? This paper investigates, how legumes are being supported by Danish municipalities emphasizing their role as ‘consumer’, ‘regulator’ and ‘facilitator’, and how PP and other means of tools being developed can be utilized as a lever to support the cultivation and consumption of locally cultivated legumes. We will elaborate on this in the following.

Public procurement

There are many approaches to Public Procurement (PP) as the concept has developed and matured during the years alongside societal changes and policy adaptation. The European Commission (EC) (2008) defines Green Public Procurement (GPP), as *“A proses whereby public authorities seek to produce goods, services and works with a reduced environmental impact throughout their lifecycle compared to goods, services and works with the same primary function that would otherwise be produced”* (EC, 2008:4). Again, Sustainable Public Procurement (SPP) goes beyond e.g., ecolabeling, environmental management systems and efficiency in energy uses, entailed within the GPP strategy (Rainville, 2018), and are defined as follows: *“A process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development - economic, social, environmental - when producing goods services or works at all stages of the projects”* (EC, 2020). Thus, both green and social criteria are included in SPP strategies, as for example environmental criteria formulated in contracts and Corporate Social Responsible (CSR) demands regarding companies use of labor (Andrecka, 2017).

Innovative Public Procurement (IPP) is, on the other hand, the strategic purchasing of goods and services which do not currently - or only to limited extend - exists on the market, hereby stimulating new product development within geographical confined markets to meet demands (Morley, 2021). According to Kristensen et. al. (2021) IPP can be connected to three mechanisms, being i) pre-commercial procurement, ii) public procurement innovation solutions, and iii) innovation partnerships. Thus, IPP is interpreted as a tool used for demand side policies creating supply side innovations (Rolfstam, 2009; Rolfstam et. al., 2010; Iossa et. al., 2018). In our research of municipal case studies, we will emphasize the above mechanisms to illuminate how PP are operationalized to integrate more legumes in the municipal food basket. Finally, the newest PP strategy is Circular Public Procurement (CPP), which has its roots in the European Commission’s (EC) emphasis on circular economy (EC, 2020) and require integration of for example environmental issue, social initiatives, new processes, and organizational thinking that integrate and merge PP strategies, thus not

merely applied as addons. As emphasized by Kristensen et. al. (2021) the CPP is a challenging and difficult procurement strategy, and by being relatively new the principles of CPP is yet immature and hard to adopt.

PP within the OECD countries account for between 13 % to 20 % of the Gross Domestic product (GDP), and reaches 17 % in the EU alone (Evans et. al., 2010). Within developing countries, the figures are even higher and reaches levels of 30 % to 70 % of the GDP, thus public money utilized to purchase goods and services (Perera, 2012). Within the EU this figure is estimated to account for 16 % of the GDP (Iossa et. al., 2018). When it comes to public sector food procurements it mainly happens at the municipal level (regional and sub-regional level), and account for approximately 63 % of all food related public purchases within the OECD countries (OECD, 2019). Emphasizing on Denmark alone, the annual budget expenses on public procurement, primarily composed by the 98 municipalities, is approximately 300 billion DKK, or 40 billion Euro (Lundsgaard et. al., 2020). Emphasis on PP is therefore not to be neglected, as the purchase volume is high and thus a potential driving factor for new produce to be included in the municipal food basket (Kristensen et. al., 2021).

Research focus

In this empirically based research paper, we investigate how PP are utilized to promote the cultivation and consumption of legumes within four case municipalities in Denmark. We will identify which power and strategies the municipalities are using to promote legumes, and which mechanism that are hampering or stimulating more locally based legume business models to develop. Field case study analysis of a legume producer and a retailer will also highlight, whether the supply chain (producers) is hampered by e.g., lack of knowledge, appropriate machinery, and legume seeds appropriate for cultivation in a Danish context. And again, are supply chain stakeholders (retailers) meet by adequate support and favorable tender procedures from municipalities? And do they possess a general willingness, to engage in an increased distribution of legumes by including such options in their bidding proposals?

No previous studies in Denmark shed light on these issues emphasizing the adaptation of legumes in the food basket of municipalities through PP strategies. Various studies however have emphasized the promotion of organic food produce in PP strategies to be included in municipal diets (Lindström et. al., 2020; Sørensen, et. al., 2016; Morgan, 2015). Thus, this study provides new information revolving legume based PP strategies and point to areas where this could be emphasized more strongly in the future with special emphasis on local produce. We will shed light on how legumes are, and can be, included in the municipal diets by *Innovation Public Procurement (IPP)*, emphasizing *Public Procurement Innovation*

Partnerships (IP), as discussed by for example Timmermans and Zabala-Iturriagagoitia (2013), Uyarra (2016) and Iossa et. al. (2018), with roots in the procurement directive of the EC (EC, 2014). We interpret municipal PP revolving legumes, as innovation towards a transition of Danish food consumption, thus IPP, and new types of cooperation between municipalities, producers, and retailers etc., thus IP.

Methodology

Analytical approach

This study combines the theoretical approach described in the following section with primary and secondary empirical data to be able to describe the landscape of municipal support to the cultivation and consumption of legumes. Suggestions to future initiatives will hence be provided and included in the discussion section of the paper, which entails knowledge from the interviews and field studies analyzed, as well as additional knowledge from scientific literature, reports, etc. This research is primarily based on explorative empirical studies (Andersen, 1990) investigating a new arena to be embraced by PP, where lack of existing literature exists to compare and discuss our findings. This research study should therefore be seen as initial studies and inspiration for other researchers to conduct investigations within the field of legumes.

Theoretic framework

The theoretical framework applied is inspired by Bulkeley and Kern (2004) and Corfee-Morlot et. al. (2009) and their findings of how e.g., municipalities can influence various sectors as for example the local energy consumption as being 'consumers', 'regulators' and 'facilitators' of energy services. This understanding was for example applied by Lybæk and Kjær (2015) in their analysis of how municipalities can support the development of the Danish biogas sector. This paper however will apply this theoretical lens to describe and understand how municipalities can support the cultivation and consumption of local legumes through such mechanisms and adopted into the municipal PP strategies (Thai, 2009; Li and Geiser, 2005).

Danish municipalities have previously supported a development of specific municipal diets by utilizing their role as 'consumers', 'regulators' and 'facilitators' by for example including organic food produce in the supply of ingredients to the food basket of municipal institutions. By constituting a market ('consumer') an adequate amount of food consumption or 'a market' could hence be guaranteed, and the requirement of such food supply were made viable by municipal political agreements ('regulator'). Various activities and support to kitchen personal, using the lever of education and training, were then provided (Lenny, 2015; Sørensen, et. al., 2016) to ease the transition to the use of organic food and hence lower

amount of meat in the municipal food basket ('facilitator'). This paper emphasizes how Copenhagen, Århus, Odense and Slagelse municipalities are adopting legumes in their municipal diets; how they currently promote this, and which barriers and opportunities can be identified in the value chain.

When looking at the municipal role as 'consumer' we will emphasize how many units (municipal institutions) are included in the municipal food diets, and the target group being e.g., young, or older citizens or both. We will also emphasize what type of legumes the municipality are requesting in their consumption of such food stuff. Within the area of municipalities being 'regulators' we further identify whether or not concrete targets and political statements are developed to support the cultivation and consumption of legumes. This can for example be the formulation of food and meal strategies emphasizing legumes, climate related policies, and other means of future tools and data needed that can encourage or stimulate the cultivation and consumption of legumes. The municipalities as 'facilitators' are investigated through activities, or levers, supporting a further purchase and use of legumes targeting e.g., kitchen personal, school activities, etc. In the discussion part emphasis on how to strengthen relevant areas identified through the empirical studies, which entails reflections to other relevant studies.

Choice of case municipalities

In our empirical data collection, we have chosen four municipalities, each representing a main part of Denmark. On the largest island in Denmark, named Zealand, the capital of Copenhagen has been chosen, also being the largest city in Denmark. Also, Århus, which is located on the mainland connecting Germany in the South, has been selected being the second largest city in Denmark. Finally, in the middle, located on the island of Funen, the town of Odense has been chosen being the fourth largest city after Ålborg. Besides the selection of three of the largest cities in Denmark, we also emphasized initiatives taken within more rural areas of Denmark, here represented by Slagelse Municipality located on West Zealand. This case represents not only a rural Danish community, but also a legume producer (Kragerup Mansion) and a retailer (Grøn Fokus), who have received support from Slagelse municipality's Business Center in developing their legume business model currently applied. Below, in Table 1, we have collected some main data to provide a short description of the four Danish municipalities.

Table 1. Characteristics of case municipalities (Danish Statistics, 2021).

	Copenhagen	Århus	Odense	Slagelse
Number of citizens	632.340	353.354	204.182	79.073
Area (km²)	292,50	467,90	305,6	568
Citizens/km²	7.082	728	662	139
CO₂ emissions from the city (t/y)	1.021.820	1.326.779	765.000	840.000
CO₂ emissions from municipal activities (t/y)	51.000	38.925	23.768	17.000
CO₂ reduction targets for the city (by year)	2025	2030	2030	2030

Data collection

Field case studies (Maaløe, 20022; Yin, 2013) and semi-structured interviews have been applied, relying on methods described by Kvale and Brinkmann (2015) and Andersen (1991). Besides primarily empirical data, presented below, also secondary empirical data and literature have been collected and utilized to broaden the discussions further.

Interviews

Interviews with municipal stakeholders dealing with food planning and purchase activities, etc. has been conducted within Copenhagen, Århus, Odense and Slagelse municipalities, with the following actors:

- Copenhagen Municipality: Astrid Dahl - Children and youth department of Copenhagen municipality & Anya Huntberg - Municipal procurement department.
- Århus Municipality: Bente Kramer Møller - Contract manager in the procurement and bidding department.
- Odense Municipality: Gitte Breum - Chef for food department & Claus Brandstrup - municipal kitchen responsible.
- Slagelse Municipality: Mette Lücke Petersen - Environment, planning and technical department of Slagelse.

Field case studies

Also, several field trips to Kragerup Mansion have been conducted in 2020 and 2021 to provide information about the cultivation, species, and yield of the chickpea production, and the establishing of and current corporation with Grøn Fokus and their dialogue with Business Center Slagelse.

- Kragerup Mansion: Olav Ditlevsen - Farmer & chickpea producer.
- Grøn Fokus: Stefan Skov-Jespersen - Legume retailer.
- Slagelse Business Center: Per Madsen - Head of the business center.

Results and Discussion

In the following sections, we will *firstly* present the data from case interviews emphasizing municipal support to legumes, being 'consumers', 'regulators' and 'facilitators', and then *secondly* turn to the field case studies of a legume producer and a retailer seeking a larger market entry for chickpea. We will thus investigate how local legumes cultivation are - or can be - supported, and which opportunities and barriers exist within PP tendering processes to support the consumption of legumes and which value chain barriers there currently exists in the producer and retailer supply part. At the end of this section, we will, *thirdly*, provide further reflections on how to strengthen the municipal support mechanisms for legumes.

Case study Copenhagen, Århus, Odense & Slagelse municipality We present our four municipal cases with emphasis on their supporting mechanisms to include legumes in their municipal food basket, emphasizing their role as being 'consumer', 'regulator' and 'facilitator'.

Copenhagen municipality

Consumer

Within the city of Copenhagen 1.200 municipal units (schools, kindergartens, old people's home, etc.), who all apply to the 'Food and Meal strategy' (Copenhagen Municipality, 2019), serve approximately 70.000 meals daily. The main target group for emphasizing more legume consumption in the municipal diet is young people (age 0-18) and not so much older people, due to their food preferences and the fact that it is more important that they like the food and get enough nutrients daily. In the future, the consumption of legumes will likely be older types of spices that are unprocessed, meaning that legume flour and different types of processed or frozen ingredient's will not be emphasized in the municipal diet (Dahl and Huntberg, 2021).

Regulator

Strategies for reducing food waste and a goal of 90 % of the food being organic have already been adopted within the municipal policies for several years now (Lenny, 2015). And in the 'Food and Meal strategy' targets are set to lower the CO2 footprints connected to the food purchase by 25 %. The municipality hence recommend all units to purchase more green food ingredients, and thus explicitly mention legumes in the diets for the future. As of now Copenhagen municipality cannot require procurement of certain legume produce from specific producers and retailers due to the restrictions entailed by the public tendering process. But if more scientific data were available, as e.g., Live Cycle Analysis (LCA) showing the environmental impact of different legume species (import v. local produced, older species v. modern species like quinoa). Having such data, the municipality could require certain purchases following such knowledge, and maybe be able to support local producers and specific legume species. Thus, more data are needed to be able to prioritize differently (Dahl and Huntberg, 2021).

Facilitator

The levers applied by Copenhagen municipality is to educate and train kitchen personal to utilize legumes in their preparing of diets. Also, school project is adopted, like school-gardens and open-school programs, where ingredients and cooking are emphasized and the basis for a good and healthy food-culture established. In the future, the municipal would like to provide more assistance to kitchen personnel to increase the overall legume purchase, and to emphasize more on the climate impacts connected to this purchase (Dahl and Huntberg, 2021).

Århus municipality

Consumer

Within the city of Århus around 550-600 units (30.000 meals) are served daily, and as opposed Copenhagen municipality the emphasis is also here on the older generation, as they, according to Bente Kramer Møller (2021) "*also tend to like the legume dishes if they taste good and are presented nicely*". Moreover, the older generation are demographically growing, and it is therefore important to include them in the legume diets as well.

Regulator

Targets of 1/3 reduction in food waste and the use of 60 % organic food in the diets are already politically decided. A 'Food and Meal Strategy 2017' has been launched targeting diets for children between the age 0-18, and addresses schools, kindergartens and after school activity centers, etc. (Århus Municipality, 2017). Only implicit emphasis on legumes crops in the strategy are formulated, as a protein source substituting meat produce. Politically decided targets of 25 % CO2 reduction connected to the food purchase have been agreed upon, but the use of more regulation and rules are not interpreted as favorable to

support a further consumption of legumes. It is, according to the municipality, more favorable to 'tell a good story' about legumes being a nutrient rich and climate friendly crop, but at the same time does not provide too much information as to avoid tiring people and face resistance. One aspect to include in this narrative could be the ESS benefits of legumes, as this knowledge is underrepresented, and the climate impacts of food purchase most often only connected to the CO₂ emissions of e.g., transportation (Møller, 2021; Brandstrup, 2021).

Facilitator

The levers applied are to educate kitchen personal, but this is applied as a peer-to-peer process in within the municipality, as they do not have financial resources to provide courses and the like. In Århus, they will support the cultural changes, which the municipal food diets are undergoing in these years, by providing good stories and narratives (Møller, 2021).

Odense municipality

Consumer

Around 86 units or 5.000 meals are served daily within Odense municipality. The target group for legume diets are children between year 0-18, and the main legume species emphasized is fababeans, lenses and peas (Breum and Brandstrup, 2021).

Regulator

Besides the politically decided targets of 60 % organic food and reduction of food waste, Odense will during 2021 formulate target for CO₂ emission reductions connected to food purchase. The current 'Food and Meal strategy, 2016' (Odense Municipality, 2016) emphasize how important healthy food is and have an ambition that Odense shall become a food-city. In the strategy no explicit requirements of legume crops are however mentioned, but implicit included as alternative protein source to meat. The target group for legume diets are children between year 0-18. As opposed to Copenhagen and Århus, Odense municipality require that 30 % of their food purchase must come from the local community, thus Funen and the small islands in the South. In this way it has been possible to impact the retailers and make them do an effort to deliver the food ingredient that Odense municipality requires. It is however important to pose the demands in a pace where the producers can keep up with the demand. Retailers are also asked to go back in the value chain and let the producers know that there *is* a market for their produce (Breum and Brandstrup, 2021).

Facilitator

The levers have for example been to develop recipes with legumes that are tasteful and nicely to increase the deployability of legume dishes. Besides this they are currently seeking to develop an IT tool that can calculate the carbon footprints of the menu's put together by the kitchen personal. In this way they will easily be able to see what consequence it has as

far as CO2 footprint, when substitute a certain part of the ingredients with another part (Breum and Brandstrup, 2021).

Slagelse municipality

Consumer

The municipality do not serve food for children between year 0-18, but only to elders in the old people's home and within some activity centers, as well as within three canteens connected to the city hall, adding up to 10 units (Trummer, 2021) equal to 600 meals per day. The Mayer has just recently requested two meat-free days a week at the city hall's three canteens. But, as pointed out by the municipality, many companies, educational institutions, and businesses are located within the municipality and hence pose a large market for utilization of legumes in their canteen food in the future (Petersen, 2021).

Regulator

Currently, there are no Food and Meat strategy, nor politically decided targets for reducing food waste, and CO2 emission connected to purchase of reduction target are not yet decided upon. There are however CO2 emission reduction targets for the city, just as silver and bronze target levels of organic food are served in the 10 units within Slagelse municipality. However, in 2022 a new climate strategy will be finalized and will include the topic mentioned above. A new Sustainable Development Strategy, which include issue like biodiversity, circular economy, and climate, has newly been finalized but do not include the benefits of legumes as far as ESS and biodiversity. It would, according to Petersen (2021) be beneficial, if such issues could be addressed in future policies related to biodiversity, as Slagelse is a rural community where the politicians are keen on emphasize initiatives supporting the agricultural sector.

Facilitator

The main lever in Slagelse is a very energetic kitchen chef who are keen of utilizing legumes in the preparation of food within the municipality. Otherwise, no activities as teaching or courses etc. are undertaken. In the future, however, the municipality would like to support the use of locally cultivated legumes in their food diets. This could be done by undertaking local development contracts and in this way promote agriculture and business within the local community, and hence a supply of local produce (Petersen, 2021). All data from the explorative study of the four municipalities are depicted in Table 2 below.

Table 2. Summary of findings: Existing and future support mechanism.

	Consumer	Regulator	Facilitator
Copenhagen	-Municipal units: 1.200 (70.000 meals per day). -Target group: Children 0-18 years. -Legume type: Unprocessed and preferably old and native species.	-Food and Meal Strategy, 2019 explicit emphasizing legumes. -Food waste reduction targets. -Share of organic food in diets 90 %. -Require 25 % CO2 reduction connected to food purchase. -Public bidding process hamper emphasis on the use of locally cultivated legume. -LCA analysis of carbon footprints of different legumes could favor the demand for specific types of legumes and producers from the local area.	-School gardens, open school education & upgrading of kitchen personal to handle legumes. -Would like to strengthen assistance to kitchen personal in regard to the climate impact of their legume purchase.
Århus	-Municipal units: 550-600 (30.000 meals per day). -Target group: All ages.	-Food and Meal Strategy, 2017 implicit emphasizing legumes. -Food waste reduction targets. -Share of organic food in diets 60 %. -Require 25 % CO2 reduction connected to food purchase. -No more regulation needed, but a need to 'tell the good stories' of legumes, e.g., ESS benefits.	-Peer-to-peer upgrade of kitchen personal to handle legumes. -Legume storytelling in focus.
Odense	-Municipal units: 86 (5.000 meals per day). -Target group: Children 0-18 years. -Legume type: Fababeans, lenses and peas.	-Food and Meal Strategy, 2016 implicit emphasizing legumes. -Food waste reduction targets. -Share of organic food in diets 60 %. -CO2 reduction connected to food purchase will be required ultimo 2021. -Require that 30 % legumes purchase must origin from the local community.	-In the process of developing an IT tool to help kitchen personal in climate friendly purchase of food ingredients. -Currently kitchen personal is provided with data on food carbon footprints from the retailers, but more data is needed. -Develop recipes of how to make dishes including legumes.
Slagelse	-Municipal units: 10 (600 meals per day). -Target group: Elder people's home, activity centers, and three canteens connected to the City Hall.	-No policies supporting the use of legumes are currently in place. - Silver and bronze target levels of organic food are served. -In 2022 a Climate Strategy will be effectuated and include: Targets for food waste & CO2 reduction targets connected to the municipal food purchase. -A Sustainable Development Strategy has been decided upon and could in the future deal with benefits of legumes related biodiversity.	-A very energetic chef supports the use of legumes within the municipal kitchens. -The municipal seeks to support local producers and retailers connected to legumes, when possible.

Field trip Kragerup, Grøn Fokus & Slagelse Business Center

In the following, we present Kragerup Mansion & Grøn Fokus, and Slagelse Business Centers' support to the development of their business model. We emphasize on which additional support the Business Center can provide, being requested by the involved stakeholders.

Actors in developing the legume business model in Slagelse.

Kragerup Mansion

The farm is located in West Zealand in Slagelse municipality (borders directly up to

Kalundborg municipality) and is a 1.200 ha large farm estate with hotel, conference, meeting and wedding facilities, etc., as well as Go-High activities (high tree climbing) and other recreational activities, as mountain bike tracts and football golf, etc. (Ditlevsen, 2020). The farm primarily cultivated cereals but have in the last couple of years also emphasized on legumes, as for example fababeans, lenses, millet, chickpea, and lupine, where the latter two initially were utilized within the Kragerup mansion's restaurant by the kitchen chefs (Ditlevsen, 2020). According to Ditlevsen (2021) the white lupines looks like small quail eggs, which the restaurant customer's like as garnish, just like they value the fresh and locally cultivated chickpea utilized in the restaurant dishes. The ground plan for 2021 is to cultivate 40 ha fababeans, 9 ha chickpea, intercropping 39 ha mixed dog grass & pea, and a same size area with white clover & barley, and well as several smaller parcels with lenses, lupine etc. Besides this most of the farmland will be cultivated with cereals (Ditlevsen, 2021).

Grøn Fokus

Around 15 km from the Kragerup Mansion, within the city of Slagelse, the company Grøn Fokus are situated, which is a retailer dealing with organic produce. Grøn Fokus began their business in 1999, with an emphasis on buying and selling organic produce from Denmark, which later also included produce from outside Denmark (www.gronfokus.dk & [Facebook.com/gronfokus](https://www.facebook.com/gronfokus)). The company primarily supply the Danish market, and very little to e.g., Sweden, Iceland, and the Faeroe Islands. The company mostly deliver organic and bio-dynamic products to professional large-scale kitchens. The company supply around 2.500 different products, whereof Skov-Jespersen (2020) estimates that 100 products are a sort of legume in any kind of form (processed or non-processed, etc.) (Skov-Jespersen, 2020).

All sorts of legumes (fresh, dried, or canned) are distributed by the company and mainly imported, as for example the chickpeas that are cultivated in Turkey. Grøn Fokus purchase their products from middle traders, and they are certified organic. The market for legumes is increasing and the chefs in the kitchens are asking for more organic legumes to include in their food preparation. It is especially chickpea, quinoa, lenses, and millet from Denmark that the costumers would like to purchase (Skov-Jespersen, 2020).

Slagelse Business Center - Initiating cooperation between actors

Due to Slagelse municipals' emphasis on supporting the cooperation between actors in the local area to support agricultural business opportunities (Petersen, 2021), Grøn Fokus and Kragerup Mansion were introduced for each other by the Slagelse Business Center (Madsen, 2021) under a busines award event in the region (Ditlevsen, 2021) - and were later established as more formal business meeting between the stakeholders (Madsen, 2021). Besides establishing the contact between the two parties Slagelse Business Center

do not provide any other facilitating service to companies etc., but they will continue to try to identify potential cooperation in the municipality between various types of businesses and the agriculture (Madsen, 2021).

Grøn Fokus would initially like to cooperate with Kragerup Mansion as they wanted to increase their share of locally cultivated chickpea. This due to job creation, the environment and the community-based issue revolving around *“producing ‘things’ in the local community”* (Skov-Jespersen, 2020). The company would like to brand their products more for being cultivated locally. They are willing to expand their current value chain, by taking a financial risk together with Kragerup Mansion to achieve a domestic production of chickpea. Grøn Fokus hence hope for larger chickpea yields on Kragerup Mansion in the future to phase out some of the imported chickpeas from Turkey (Skov-Jespersen, 2020).

The motivation for Kragerup Mansion to cooperate with Grøn Fokus was rooted in a market entry opportunity. They would like to brand their legume produce more, but it is difficult as the knowledge is low, and the market still limited and immature. People do for example not, according to Ditlevsen (2020) know about ESS benefits of legumes, and thus do not recognize what he is doing with his soil, the local environment, and on the farm. Young people might know about soybean from South America and avoid supporting this by eating local produce. But their knowledge stops there. *“People need to be more food-educated and know about legume dishes, as well as raw materials cultivation and soil”* (Ditlevsen, 2020).

Grøn Fokus and Kragerup Mansion appreciate the cooperation facilitated by Slagelse Business Center, but they would like to see additional supportive mechanisms. For example, financial support to machinery that e.g., efficiently rinses the chickpeas, as such processing machinery are difficult to identify, or it could be help to applications for governmental funding for purchase of machinery or other types of processes or experiments e.g., refined seeds, which could support a larger market entry for cultivating chickpea. Thus, more support connected to the financial and regulatory support, based on political mandates from municipal politicians. Finally, Slagelse municipality are suggested to begin to purchase chickpeas from Kragerup Mansion to secure a larger and stable market, which could be utilized within the municipal kitchens, etc. (Ditlevsen, 2021).

Also, new business opportunities within other types of plant-based food supply could be pointed out and facilitated by Slagelse Business Center. Grøn Fokus, for example, sees great potentials in cooperation with the dairy company Arla - situated just across the street from them - and a potential production of new types of plant products, as e.g., oat-milk, which Grøn Fokus would like to be a part of. Thus, more facilitating initiatives from the

Business Center are requested (Skov-Jespersen, 2020). A summary of the data from the explorative study is provided in Table 3 below.

Table 3. Summary of findings: Existing and future support mechanism.

	Consumer	Regulator	Facilitator
Slagelse Business Center	-Should identify new market opportunities, e.g., oak-milk production by Arla.	-Acquire political mandate to support legumes by supporting purchase of rinsing machinery financially.	-Previously established the meeting between Grøn Fokus and Kragerup Mansion. -Should assist in applying for funding, etc. -Must be more active in facilitate cooperation between local companies, e.g., Arla and Grøn Fokus on the production and distribution of new products, as for example oak-milk.
Slagelse Municipality	-Suggested to begin purchase of chickpea from Kragerup Mansion for their kitchens to secure a larger and stable market.		

Strengthen the municipal support mechanisms - reflections

According to our empirical data legume strategies and targets could be included as a **regulator** element in municipal biodiversity plans in the future due to the many ESS benefits of such legume crops (Petersen, 2021; Møller, 2021), and hence support the agricultural sector and the environment within municipalities. According to Møller (2021) it is however also important to inform and educate citizens about legume ESS, than e.g., adopting new policies and goals on paper. Thus, by integrating grain legumes in strategic plans legume crops will achieve an additional platform for policy engagement, and by appropriate narratives knowledge can be disseminated within the society. This also account for the food strategies, where legumes should be mentioned more explicitly in the municipal Food and Meal strategies to underpin the importance of legumes being an important part of the food transition.

Emphasis on mechanisms that assist kitchen personal in addressing the use of legumes in the food basket could be strengthen by various IT tools calculating CO2 carbon footprint of various food ingredient choices, etc. Emphasizing consumption of legumes from local producers can be **facilitated** by LCA tools identifying the environmental impacts of local produce compared to imported produce. According to Huntberg (2021), municipalities underlying tender processes, will then have a scientific and legitime platform to make purchase requirements on, meaning that they can support special types of legumes, if the LCA supports this. This could facilitate a **consumer** role in which municipalities support a larger market for legumes being specific sorts from certain locations (Ibid.). But what are the

obstacles and opportunities in the value chain for increasing the municipal consumer role? We will shed light on this in the following section.

Lack of knowledge in the legume value chain and support mechanisms

Legume producer's capability to cultivate and hence deliver legumes at an adequate amount of to the municipalities, are currently a barrier for municipalities being a stronger **consumer**. According to Brandstrup (2021) and Ditlevsen (2021), a balance is currently needed between the municipal demands and the capabilities of supplier, as new farm systems must be deployed, unless the legumes required are e.g., green pea and fababean, which Danish farmers are costumed to cultivate. Lenses, lupine, chickpea etc. need to increase in yield just as the quality must be improved for some legumes to be appropriate for human food (Bertelsen, 2021). This has for example been the case for fababeans which solely have been cultivated in Denmark for use as animal feed with high levels of tannin (bitter taste) and the need for heat treatment to enhance the protein (amino) uptake. New more refined seeds are however available now appropriate for human food. For chickpea variations in size and color are still normal, which needs to be addressed to reach a larger market (Ditlevsen, 2021).

As for the case of Kragerup Mansion there is also technical obstacles for an increased production of chickpea, as rinsing and sorting machinery are not readily available. Inexpensive and non-advanced sorting machinery has been purchased from Poland, and efforts has been made to identify companies that could provide such service, which was found to be unfavorable expensive (Ditlevsen, 2020; 2021). At Kragerup Mansion better chickpea seeds are also requested. Seeds being refined for the Danish context and climate, with more stable yield as far as t/ha, color, and size (Ditlevsen, 2021). Economic support and help with funding application work are thus questioned. In the retailer part of the value chain, Grøn Focus already emphasize on organic farm produce hereunder legumes, but the need to evolve further into other types of vegetable businesses are hampered by lack of engagement in the local community, and the capability of seeing business opportunities between local companies. Thus, more emphasis on stakeholders assisting or getting involved in this area, are requested (Skov-Jespersen, 2020).

Emphasis on legumes through PP tendering and negotiations

The empirical data showed that some municipalities would like to emphasis the use of specific local legume species and even on specific producers in their purchase of legumes and thus apply *innovation public procurement* (IPP) to provide a market and a transition of the municipals food basket to include domestic legumes as a new produce. Municipalities thus not only look to pea and fababean in their emphasis on legumes, however being the most cultivated legume crops (Bertelsen, 2021; Økologisk Landsforening, 2021).

Municipalities are however challenged by the public tendering process, which PP within government institutions are subject to. In the following, we emphasize this issue.

Cooperation between local stakeholders could, however, be established through *innovation partnerships* (IP) to facilitate and secure the cultivation and consumption of local legume produce, which are not available or not adequately available on the market (EU, 2021). This could be done by larger municipalities that apply to tendering regulation (EC, 2007), where they e.g., engage in a partnership with a producer and apply experiments in the cultivation of a certain e.g., local old sort of legume, and where the municipal kitchen staff seek to develop tasteful and nicely presented dishes using this specific legume (Petersen, 2021). Such innovative partnership could be financed by a e.g., public business fond (erhvervs-pulje) (anonymous informant).

When the specific bulk of legumes are large enough from the producer, and found relevant as a food basket ingredient, it will be something the municipality could include in their tender formulation for the next bidding period (anonymous informant). Hereby, retailers will be asked to, and thus must include the specific sort of legumes in their bidding proposals to be competitive and develop their portfolio of produce (Brandstrup, 2021). This is what Rosell (2017) defines as retailers: “..... *being awarded by means of a negotiated procedure*”. Within smaller municipalities not applying to tendering regulation - due to lower threshold purchases and with an aim of for example supporting small and medium sized enterprise's (SME's) - they could engage in a negotiation with retailers being awarded in this way, hence not being obliged to tender (EC, 2007; Rosell, 2017).

Conclusion

Currently, there is a growing interest in Denmark for the consumption of legumes for human food, but most of the grain legumes are imported (Økologisk Landsforening, 2021; Bertelsen, 2021) besides pea and fababeans, which danish farmers are costumed to cultivate, and where the latter have been improved for the Danish context by adopting to better seeds (boxer & figuero) (Bertelsen, 2021). There exists both barriers and opportunities for a further uptake of legumes in the municipal food basket, exemplified in the following. The empirical data hence shows that Danish municipalities and retailers like Grøn Fokus - but also for example Hørkram, Fynsk Psykologi and Biogan (Brandstrup, 2021; Økologisk Landsforening, 2021) - are interested in supporting more local produce including older sort of legumes, which for example includes lenses, chickpea, and peas, being more popular legumes for human consumption compared to fababeans and lupine (Landbrugsavisen.dk 2020b; Bertelsen, 2021). The yield and quality of for example lenses, chickpea and lupine are however still to be developed further (Ibid.). Municipalities' support to the promotion of such legumes through various PP strategies - *innovation partnership*

and *negotiations partnerships* - is extremely valuable, as emphasized in this paper, but however not enough to increase the yield and quality over a short period of time, as simply increasing the demand for certain legumes is not sufficient.

As the empirical data shows, support to refining seeds, machinery to deal with sorting and peeling etc. must also be supported, developed, and disseminated. Economic support and knowledge transfer to farmers must also be provided, as these types of legumes are more difficult to cultivate than traditional legumes like e.g., pea and fababeans (Landbrugsavisen.dk, 2020b; Bertelsen, 2021). Research supports the need for capacity building in a Danish context regarding appropriate technology and knowledge of cultivation practices (Legvalue, 2020). Thus, the 'consumer', 'regulator' and 'facilitator' role of municipalities within legume PP are a strong mechanism to support the consumption of legumes by various means, but must additionally be supported by national initiatives, like economic support, knowledge interventions and capacity building on a larger scale. This is especially important when it comes to the more challenging legumes, here lenses, chickpea, and lupine, as opposed to for example pea and fababeans, where adequate knowledge seems to exist.

Acknowledgment

This paper is a result of research activities conducted as part of the 'LegValue' project (<http://www.legvalue.eu>). The research has received funding from the European Union's Horizon 2020 research and innovation program, grant agreement Nr. 727672.

References

Andrecka, M., 2017. Corporate social responsibility and sustainability in Danish public procurement. *European Procurement & Public Private Partnership Law Review* 3 (12), 333-245.

Andersen, I., 1990. *Valg af organisations sociologiske metoder: Et kombinationsperspektiv*. Samfundslitteratur, 1st Udgave. ISBN: 87-593-0229-1. Copenhagen, Denmark.

Bertelsen, I., 2021. SEGES. Webinar presentation on the 22-2-2021 at 1 to 4.30 pm.

Breum, G., 2021. Odense Municipality: Interview with Gitte Breum - Chef for food department

Brandstrup, C., 2021. Odense Municipality: Interview with Claus Brandstrup - municipal kitchen responsible.

Bulkeley, H. and Kern, K., 2009. *Local Climate Change Policy in the United Kingdom and Germany*. Discussion paper for the Anglo-German Foundation. WSB, Berlin, Germany.

Corfee-Merlot, J., Kamal-Chaoui, L., Donovan, M.G., Cochran, I., Robert, A., Teasdale, P.J., 2009. *Cities, Climate Change and Multilevel Governance*. OECD Environmental Working Papers # 145. OECD Publishing.

Copenhagen Municipality, 2019. *Food and Meal strategy*, Copenhagen municipality, Economy division, Denmark

Danish Statistics, 2021. Data collected regarding the cities of Odense, Slagelse, Copenhagen and Århus. At: <https://www.dst.dk/da/Statistik/kommunekort/kommunefakta>.

Dahl, A., 2021. Copenhagen Municipality: Interview with Astrid Dahl - Children and youth department of Copenhagen municipality.

Ditlevsen, O., 2020; 2021. Kragerup Mansion: Olav Ditlevsen - Farmer & chickpea producer.

Evans, L. et. al. 2010. *National Green and Sustainable Public Procurement Criteria and underlying Schemes*. EC, Didcot. Report written by AEA Technology for DG Environment.

EC, 2014. EC Directive 2014/24/EU of the European Parliament and Council on Public Procurement and Repealing Directive 2002/18/EC.

EC, 2007. *Tenders' regulations*. Commission Regulation (EC) No 1454/2007. Available at: <https://www.legislation.gov.uk/eur/2007/1454/article/2/adopted>.

EC Directive, 2014. *Directive 2014/24/EU of the European Parliament and Council on Public Procurement and Repealing Directive 2004/18/EC*. European

EU, 2021. *Public tendering rules*. At: https://europa.eu/youreurope/business/selling-in-eu/public-contracts/public-tendering-rules/index_en.htm. Accessed the 18-2-2021.

EC, 2020. *Circular economy action plan – For a cleaner and more competitive Europe*. https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf, Commission, Brussel, Belgium.

EC, 2008. Green Public Procurement. Available at: <https://www.switchtogreen.eu/eu-green-public-procurement/>. Accessed the 2-5-2021.

EC, 2020. Green and Sustainable public procurement. Available at: ec.europa.eu/environment/gpp/versus_en.htm. Accessed the 5-2-2021.

Food and Agricultural Organization, FAO, 2018. *Food Outlook - Biannual report on global food markets*. At: <https://www.globalagriculture.org/fileadmin/files/weltagrarbericht/Weltagrarbericht/02Hunger/2018FAOOutlookNov.pdf>. Accessed the 22-5-2019.

Huntberg, A., 2021. Copenhagen Municipality: Interview with - Municipal procurement department. of Copenhagen municipality.

Iossa, E., Biagi, F., Valbonesi, P., 2018. Pre-commercial procurement, procurement of innovative solutions and innovation partnerships in the EU: Rationale and strategy. *Econ. Evolut. N. Technol.* 8 (27), 752-771.

IFRO, 2012. *Danmarks rolle i de globale værdikæder for konventionel og certificeret soja og palmeolie* IFRO Udredning. By Bosselmann, A. S. and Gylling, M., Institut for Fødevarer- og Ressourceøkonomi, Copenhagen University, Denmark.

IFRO, 2014. *Ansvarlighed i værdikæderne for soja og palmeolie* IFRO Udredning. Bosselmann, A. S., Lind, K. M. H, Gylling, M. Institut for Fødevarer- og Ressourceøkonomi, Copenhagen University Denmark.

Jensen, E. S., Peoples, M. B., Hauggaard-Nielsen, H., 2010. Faba-bean in cropping systems. *Field Crop Research* 115, 203-216.

Kristensen, H.S., Mosgaard, M.A., Remmen, A., 2021. Circular public procurement practices in Danish municipalities. *Journal of Cleaner Production* 281, 124962.

Kvale, S. Brinkmann, S., 2015. *Det kvalitative forskningsinterview som håndværk*. 3. Udgave. Hans Reich Forlag, ISBN: 9788741263779. København, Danmark.

Landbrugsavisen.dk, 2020a. *Plantebaseret mad skal smage godt - og dansk*. <https://landbrugs-avisen.dk/avis/mark/plantebaseret-mad-skal-smage-godt-og-dansk>. Accessed the 7-5-2021.

Landbrugsavisen.dk, 2020b. *To arter i førertrøjen for bælgplanter til fødevarer* <https://landbrugsavisen.dk/mark/arter-i-førertrøjen-bælgplanter-til-fødevarer>. Available at: Accessed the 15-2-2021.

Li, L., Gejser, K., 2005. Environmentally responsible public procurement (ERPP) and its implications for integrated product policy (IPP), *Journal of Cleaner Production* 13 (7) 705-715.

Lindström, H., Lundberg, S., Marklund, P.O., 2020. How green public procurement can drive conversion of farmland: An empirical analysis of an organic food policy. *Ecological Economics* 172, 106622.

Lundsgaard, C.A., Hansen, P.M.S., Pedersen, J.M., Viegan, J., 2020. *Prisen for Cirkulære indkøb*. Danish Environmental Protection Agency, Copenhagen, Denmark.

Lenny, M., 2015. *City food policies - Case study number 4. Towards a sustainable Public Food Service in Copenhagen using the lever of education and training*. Available at: http://base.citego.org/docs/fiche_copenhagen.pdf. Accessed the 10-6-2021.

Legvalue, 2020. *Fostering sustainable legume-based farming systems and agri-feed and food chains in the EU*. Legvalue EU submission (Deliverables D 5.3).

Lybæk, R. and Kjær, T., 2015. Municipalities as facilitators, regulators and energy consumers: enhancing the dissemination of biogas technology in Denmark. *Int. J. of Sustainable Energy Planning and Management*, 8,17-30.

Maaløe, E., 2002. *Case studier af og om mennesker*. Akademisk Forlag, 2.Udgave, ISBN: 87-500-3701-3. København, Danmark.

Madsen, P., 2021. Slagelse Business Center: Interview with Per Madsen - Head of the business center.

Morley, A., 2021. Procuring for change: An exploration of the innovation potential of sustainable food procurement. *Journal of Cleaner Production* 279,123410.

Morgan, K.J., 2015. Nourishing the city: the rice of the urban food question in the Global North. *Urban Study* 5(8), 1379-1394.

Møller, B.K., 2021. Århus Municipality: Interview with Bente Kramer Møller - Contract manager in the procurement and bidding department.

Nemecek, T., von Richthofen, J. S., Dubois, G., Casta, P., Charles, R., Pahl, H., 2008. Environmental impacts of introducing grain legumes into European crop rotations. *European J. of Agro.* 28, 380-393.

OECD, 2019. Government at a glance 2019. Accessed the 20-1-2020.

Odense Municipality, 2016. Food and Meal strategy, titled *Sammen om bedre måltider*. Odense municipality, Denmark.

Perera, O. 2012. *The case of Pursuing Sustainable Public Procurement in Lower income countries*. International Institute for Sustainable Development, Manitoba.

Smith, J., Andersson, G., Gourlay, R., Karner, S., Mikkelsen, B.E., Sonnino, R., Barling, D., 2016. Balancing competing policy demands: the case of sustainable public sector food procurement. *Journal of Cleaner production* 112: 249-256.

Petersen, M., 2021. Slagelse Municipality: Interview with Mette Lücke Petersen - Environment, planning and technical department of Slagelse.

Rolfstam, M., 2009. Public Procurement as an innovation policy tool: the role of institutions. *Science and Public Policy* 36(5), 349-360.

Rolfstam, M., Phillips, W., Bakker, E., 2010. Public procurement of innovation, diffusion and endogenous institutions. *IJPSM*. 24(5), 452-468.

Rainville, A., 2018. Standards in green public procurement – a framework to enhance innovation. *Journal of Cleaner Production*. 167, 1029-1037.

Skov-Jespersen, S., 2020. Grøn Fokus: Stefan Skov-Jespersen - Legume retailer.

Rådet for grøn omstilling, 2020. *Fra foder til føde – en fælles vision for et bæredygtig dansk landbrug*. Available at: <https://rgo.dk/fra-foder-til-foede-en-faelles-vision-for-et-baeredygtig-dansk-landbrug>. Accessed the 17-3-2021

Rosell, J., 2017. Urban bus contractual regimes in small- and medium-sized municipalities: Competitive tendering or negotiation? *Transport Policy* 60, 54-62.

Sørensen, N.N., Tetens, I., Løje, H., Lassen, A.D., 2016. The effectiveness of the Danish Organic Action Plan 2020 to increase the level of organic public procurement in Danish public kitchens. *Public Health Nutrition* 19(18), 3428-3435.

Timmermans, B. and Zabala-Iturriagoitia, J.M., 2013. Coordinated unbundling: A way to stimulate Entrepreneurship through public procurement for innovation. *Science and Public Policy* 40(5), 674-685.

Thai, K.V., 2009. *International handbook of public procurement*. Routledge Oxfordshire, UK ISBN: 978-1-4200-5457-6.

Trummer, R., 2021. Project manager at Slagelse municipality. Personal e-mail correspondence on the 25/2/2021.

Uyarra, 2016. The impact on Public Procurement on innovation: In *Handbook of innovation policy impact*, ed. By J. Edler, P. Cunningham, A. Gök and P. Shapira, 355- 381. Cheltenham: Edward Elgar, Von Hippen, 2005. *Democratizing Innovation*, Cambridge MA, MIT Press.

Yin, R. K., 2013. *Case study research - Design and Methods* 5th revised edition, SAGE Publications Inc, New York USA.

Zander, P., Amjath-Babu, T. S., Preissel, S., Reckling, M., Bues, A., Schläfke, N., Kuhlman, T., Bachinger, J., Uthes, S., Stoddard, F., Murphy-Bokern, D., Watson, C., 2016. Grain legume decline and potential recovery in European agriculture: a review. *Agron. Sustain. Dev.* 36(26).

Økologisk Landsforening, ØL, 2021. *Der er stor interesse for danskproducerede bælgplanter*, ØL. Available at: <https://nyheder.okologi.dk/mark-og-stald/der-er-stor-interesse-for-danskproducerede-baelgplanter>. Accessed the 7-4-2021.

Århus Municipality, 2017. *Food and Meal strategy*, Århus municipality, Children and Youth division, Denmark.