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Cooperation Models, Motivation and Objectives behind Farm–School Collaboration: Case Insights from Denmark

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Abstract. Children lack an understanding of and connectedness to food and agriculture, while policies are calling for more emphasis on food and nutrition at school. As a result, foodscapes at school are increasingly the focus of public policy. More initiatives are targeting food literacy of young people and their ability to understand the food system. Thus, efforts are made to promote food literacy through strengthening of farm–school links. The case-study research from Denmark investigates existing cooperation arrangements in farm–school collaboration and the underlying motivation of the farmers and teachers. Findings show distinct differences in motivation. Farmers want to create transparency in their production, ensure support for the agricultural profession or promote food and agricultural literacy. The idealistic motivation of teaching children about food and agriculture weighs higher than economic incentives. Teachers display academic motives for engaging in farm visits, but also a broader focus on shaping children's world views, connectedness to food and nature and fostering life skills. The farm can be an important setting for promoting food, agricultural and ecological literacy. We propose more generic collaboration models of farm–school collaboration to characterize the field: from short-term, informal cooperation involving just a farmer and a teacher to longer-term and closer collaboration involving several teachers, farms, schools or other stakeholders from a foodscapes approach. These characterizations of farm–school collaboration can contribute towards future research of farm–school programmes. The study applies a foodscapes approach and in doing so uncovers learning opportunities in the foodscapes in and outside the school, which goes beyond eating. This adds to a broader understanding of school foodscapes.

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Introduction

> 'Send them to regain in the open fields the strength lost in the foul air of our crowded cities' (Rousseau, 1979).

Already in 1782, Jean-Jacques Rousseau emphasized the need for connecting urban children to agriculture in his book on education, entitled Émile. Today, the disconnection from rural and natural environments is even greater with a massive gap between food producers and consumers. Children lack a connection to nature, food production and an understanding of the impact of their food choices due to urbanization and an increasingly complex and globalized food system (Harmon and Maretzki, 2006; Hess and Trexler, 2011). UNEP draws attention to the environmental impact of food and agriculture, being 'one of the most important drivers of environmental pressures, especially habitat change, climate change, fish depletion, water use and toxic emissions' (UNEP, 2010). The World Watch Institute estimates that up to 51% of all annual greenhouse gas emissions are from livestock production alone (Goodland and Anhang, 2009). Thus, food and agriculture in primary school curricula deserve special attention to promote sustainable consumption practices amongst the future generations. Academics and practitioners across Europe and the USA highlight the importance of reconnecting children with food production and the environment. The aim is for children to understand agricultural production, that their food choices affect the food system and nature, and to enable them to make informed and sustainable food choices (Berry, 1990; Pollan, 2006; Mayer-Smith et al., 2009; Smith, 2009).

Food and agricultural education constitute something tangible to which children can relate. It includes daily experiences with food (psychological, social and cultural) that can be tied to more intangible societal and environmental dimensions. Food education, including farm–school collaboration, can ideally bridge this gap between people, nature and food production. According to Illeris (2006), the interaction between sensory impulses and feelings filters subjectively relevant 'traces' archived in the long-term memory. This can be activated on a farm by doing hands-on activities. Skills-related memories from planting, smelling and walking around a farm, doing experiments and using language are harder to forget. Cognitive memories from the classroom are more likely to be forgotten. Thus, the farm setting is ideal for fostering motivation, interest and a deeper learning. The school reform undertaken in Denmark in 2014 supports such efforts to enhance hands-on and experimental learning. It includes more hours in school combined with goals of supporting outdoor education and collaboration with local organizations and enterprises, e.g. farms.

Schools have long been viewed as an important arena for promoting a sustainable development agenda in the food system, in health and in environmental protection. Experiences from the USA and Italy show that collaboration between farms and schools is an important driver for reconnecting the economic and social relations between producers and consumers. These relations, which include education, can ideally push for health, ecological, social and economic benefits in the food system, shifting towards a local food supply and multifunctional farms (Morgan and Sonnino, 2008; Canavari et al., 2011; Hess and Trexler, 2011; Feenstra and Ohmart, 2012; Mikkelsen, 2013). Such collaboration creates a new understanding of the school as a place of social practice related to food and hands-on learning. Opportunities to go to farms, engage in school garden activities, and in other ways experiment with food are important components of these hands-on food activities.

Farmers across Europe have opened their farms to visitors for decades. City farms or school gardens were widespread in the Nordic countries, including Denmark, already in the early 1900s. Today there is a wealth of programmes like farm-to-school, farm-based education, farmer visits to the classroom, school and community garden programmes in countries such as the USA, Canada, Australia, Brazil, United Kingdom, Ireland, Germany, Netherlands, Norway, Italy and Denmark (Canavari et al., 2011; Ratcliffe, 2012; Roche et al., 2012; Moss et al., 2013). This cooperation varies from a focus on school food supply, school gardens on farms or at schools, to collaboration related to food and farm education.

Farm–school collaboration covers two distinct types: farm-to-school programmes and farm-based education. Farm-to-school (F2S) is a broad definition for bidirectional school-based programmes common in the USA connecting schools and local farms with the objectives of serving local and healthy meals in cafeterias or classrooms, improving student nutrition, providing health and nutrition education opportunities and supporting small and medium-sized local and regional farmers (Joshi et al., 2008). It includes eating and educational components. In the US, 31% of schools (2,401) participating in the US Department of Agriculture's Farm-to-School programme conduct student field trips to farms or orchards (USDA, 2015), which fall under the educational part of farm-to-school programmes. Farm-based education (FBE) is a unidirectional programme. The farm is a setting for learning and the farmer is an authentic expert for students to learn from. FBE is the most common approach to farm-school cooperation in Denmark and most European countries. Another type of collaboration is to have a farmer come to the classroom, and programmes such as Future Farmers of America. The latter is a national programme with local chapters aiming to provide agricultural education to young people, preparing them for careers, and making informed choices related to global agriculture, food and natural resources systems.

No research to date has documented cooperation between farms and schools in Denmark, and many other European countries. In Denmark, the collaboration is mainly unidirectional, focusing almost entirely on educational aspects of farm-based education and integrating this in the classroom in various ways. Nevertheless, whole-school approaches are emerging, involving food supply, food service, school food policy and learning (Food for Life Partnership, 2013; Ruge and Mikkelsen, 2013)

Against this background, the aim of this article is to identify models of cooperation between farms and schools in Denmark with reference to international practice as well as to identify the motivation and objectives of the two key actors: teachers and farmers. Their motivation and objectives (intended learning) are essential to investigate, as they determine the content and actual learning opportunities for children, ultimately impacting on the benefits of these programmes for children. The different cooperation models, stakeholder motivations and trajectories in farm–school collaboration have implications for policy and practice: Thus this article also aims to inform research and policy for the development of future strategies. The research questions are:

- How can farm-school programmes in Denmark be characterized and linked to the concept of foodscapes?
- What are the objectives and motivation of farmers and teachers in Danish farm-school programmes?

State of the Art of Farm-to-School and Farm-based Education

Studies on farm-to-school programmes from the USA focus on the economic aspects, actors, food supply, provision of schools meal, and less on educational aspects. A study from Vermont, USA, looked at the actor network including the flow of financial resources, food and information (Conner et al., 2011). Allen and Guthman (2006) looked at the political philosophy, economic rationale and discourses. Other studies focus on the supply of locally produced foods in schools combined with nutrition and food education and its impact on children's fruit and vegetable consumption. A review of 15 studies of programmes in the USA documented increases in daily fruits and vegetable intake (Joshi et al., 2008). A study surveying 632 elementary students in Vermont also looked at dietary benefits (Roche et al., 2012). Similarly, Ratcliffe (2012) pointed out in a qualitative study and research review that the programmes on school food look promising in relation to addressing childhood obesity. In fact, several F2S programmes and related evaluation research are framed within either an obesity prevention discourse or an economic discourse related to farmers. Other studies show that F2S programmes have further benefits, such as promoting life skills and better eating habits (Graham et al., 2004; Joshi et al., 2008), when incorporating healthy foods with classroom and farm- and garden-based educational activities. The review by Joshi et al. (2008) showed that educational activities can increase knowledge about growing cycles, sustainable agriculture and gardening. Other impacts such as development of social skills, self-esteem, responsible behaviour and increased physical activity were also noted (Joshi et al., 2008). Only a few studies focus on teachers and their experiences.

Limited peer-reviewed research on FBE is available. Jolly and Krogh (2011) document farm-based education in Norway, highlighting how the farm is used as a setting for place-based learning and the farmer being a role model for students to learn about farming and other practical trades. Joining farmers and teachers together in workshops has been a way of creating a pedagogical arena for developing collaboration and curricula for children to work with and care for nature, the local area and facilitating experiences and connections on which to build an understanding about sustainability (Jolly and Krogh, 2011). In Italy, Canavari et al. (2011) document how 'educational farms' aim to develop schoolchildren's knowledge of the countryside, biological cycles, agricultural production, processing and related products. The overall focus is on consumer education: the link between production, consumption and the environment with sustainable development as the underlying perspective (Canavari et al., 2011). Similar FBEs are found in countries such as Germany, Finland, Poland, Austria, and Netherlands.

Conceptual Framework

The school has developed increasingly into a recognized setting for promoting food literacy and a broader ethical, social and ecological understanding of agricultural and food systems. At the same time, school food service and eating practices are slowly changing and schools are increasingly becoming the target of ambitious healthier eating strategies. Farm–school cooperation is part of this complex food, nutrition and health reality students encounter in school. From traditionally having the simple service provision task, the school food reality is in a state of transition (Morgan and Sonnino, 2008). It has become a target for food strategies dealing not only

with foodservice but also increasingly considering food as an object for learning. As such the foodscape concept is in line with the whole school approach (Langford et al., 2014) used with success in school interventions. The whole school approach to health and food involves capturing the learning potentials related to hands-on-food activities of, for instance, school gardening, farm–school links, taste education, etc. The approach is about the school setting and student involvement to improve health and to implement activities including the social, physical, educational, and policy levels at the school. It involves multiple stakeholders and resources and gives attention to the school ethos and its ability and potential to put issues of food, nutrition, life skills and health on the agenda (Henderson and Tilbury, 2004). We use 'foodscapes' to refer to the mesh of food, place and people that comprise the real and imagined food environments that constitute sources of energy and nutrients and opportunities for learning. In line with the whole school approach, the foodscape concept is increasingly accepted as a useful way to look at the broad range of determinants that shapes food and nutrition literacy of young people.

The foodscape mindset takes inspiration from the settings approach to health promotion by WHO in 1986 and later conceptualized by Dooris (2009). The 'scape' concept was originally suggested by Appadurai to capture the interconnectedness of things through place and time (Appadurai, 1996). It has been further developed by different scholars into the idea of 'foodscapes' (Mikkelsen, 2011; Torralba and Guidalli, 2013) A foodscape is a way of referring to and understanding the complex socio-physical environment at school in relation to food, eating and learning. The school foodscape stretches from food provision to curricular activities aimed at increasing the food literacy of young people. We argue that farm–school links can be considered an important part of the curricular activities that, together with the broad spectrum of food activities, make up the school foodscape. By fitting the earliest stages of the stable-to-table chain into a foodscape context, we invite a holistic approach to understanding the complex social interactions taking place in relation to eating and learning at school.

A foodscape is made up of cultural, historical, economic, personal and political elements as well as social landscapes that are related through food, including the farm. Adema (2006) refers to the notion of foodscapes through its ability to capture complex relationships between people, food and surroundings. The idea of foodscapes is inspired by Gibson's (1986) notion of affordances, which are the action possibilities that the environment offers that come into play through the perception of individuals. It opens up for a discovery of new potentials in the environment: that a foodscape offers possibilities for promoting healthy eating, environmental awareness and food and agricultural literacy. Food growing in is an obvious example. These opportunities exist in relation to the school food-service environment and in relation to the learning potentials embedded in the environment of the school and farm. These possibilities are discovered by the agents (teachers, farmers and others) and are dependent on their ability to explore these. In the case of farm–school links, action possibilities connect to the ability to discover and explore learning potentials in the food and agri-environment of the farm and link them to the food reality of the school and home. The foodscape concept will be used to understand the farm–school links and programmes and their relevance for the school setting.

Research Context and Methods

The Danish Agriculture and Food Council (DAFC) registered that over 12 000 school-

children visited farms in each school year from 2010 until 2014. This is a relatively small number out of the approximately 550 000 students in Danish public schools (Bager, 2013). Yet an unknown percentage of farm visits are unregistered. DAFC has over 350 participating farms across Denmark. Organic Denmark (OD) and the Producers' Association for Organic Schoolyards initiated an educational programme with 35 'organic schoolyards' on farms in 2013. Organic schoolyards are farms that take in classes for visits and provide educational materials before and after the visit (Dyg, 2014).

The article presents findings from a PhD thesis (Dyg, 2014) involving case studies conducted in Denmark from September 2011 until April 2013. Four maximum variation cases of exemplary farm–school collaboration were selected reflecting different types of farms and farm–school collaboration, including one with a whole school approach. The following selection criteria were applied:

1. variation among farms: part-time farms, full-time farms, farms with integrated production and specialized production, cooperative farms, conventional and organic farms.
2. variation among schools: a. schools integrating farm visits into a longer educational programme related to food production, consumption, sustainability, health and environment, science, etc. in one or more subjects or as interdisciplinary projects; b. schools with an established long-term collaboration with farmers and/or integrating farm visits with other activities at the school (e.g. food service, school policy, hands-on-food-activities); and c. teachers from rural and urban, public and private schools.

The case selection included both uni- and bidirectional farm-to-school collaboration types.

Multiple sources of evidence were gathered, including a research review, analysis of teaching materials and learning plans, semi-structured qualitative interviews with farmers (6), teachers (9) and experts on didactics and food education from agricultural organizations (5). Teachers of third to ninth grades were interviewed to obtain different perspectives on how farm visits and food and agricultural themes are integrated in the teaching. All qualitative interviews were carried out by phone or in person; they were combined with farm visit observations. The interview topics are presented in Table 1.

The empirical phase included initial and follow-up interviews with key inform-

Table 1. Topics covered by the interview questions.

Teachers	Farmers
1. Motivation and objectives of the collaboration with farmers	1. Motivation and objectives of the collaboration with schools/teachers
2. Learning goals, content and teaching methods	2. Content covered during visit and teaching methods
3. Integration of the farm collaboration into subjects	3. The farmer's role and cooperation with teachers
4. Students' learning from the collaboration	4. Learning objectives for children's learning
5. Own values related to nature, food and sustainability	5. Own values related to nature, food and sustainability
6. Barriers and opportunities in farm–school collaboration	6. Barriers and opportunities in farm–school collaboration

ants in interest organizations to get an overview of farm–school collaboration and their organization's motivation and objectives. It served as external validation of findings from interviews with farmers and teachers. Farms were selected with assistance from the Organic Schoolyard programme and DAFC. Through contact with farmers and during farm visits, teachers were approached for interviews and additional observations on-farm or later in the classroom. A review and analysis of educational materials on agriculture and food in Denmark was also conducted.

Nvivo 10 was used for data analysis, through which interview transcripts, case-study reports and other empirical data were categorized.

Findings

Farm–School Cooperation Cases and Typologies

In the following section, a description of the four cooperation models is presented based on the case studies. Their characteristics are summarized in Table 2 according to relation type, mode of curricular integration, cooking and eating modality, farm and production type. The table provides an overview of the four cases, which will be used to suggest more generic typologies.

Cooperation through Single Farm Visits

The single farm visit is the most common model of collaboration. In case study 1, a conventional dairy farmer near Copenhagen takes in schools on single farm visits. This is a part-time, family-run farm located around an hour and a half from Copenhagen by public transport. Due to relatively easy access, the farmer takes in on average 50–60 visits per year, and sometimes up to 80. The farm is a conventional dairy farm. The farmer makes explicit that she will not take in classes who are just there for a tour and a day off without any educational content (Interview with farmer). The farm visit is conducted in a traditional way: a tour around the farm including the stables, looking at calves and young cows as well as dairy cows. During the visit, pupils see the different stages of the cow's life and the different processes and conditions under which the cows live. The pupils are eager to ask questions and the farmer also asks questions of the children. The farm visit was part of a longer interdisciplinary theme about animals, which the fourth grade teacher integrated in science and mathematics.

Students from eighth and ninth grades of a private rural school also visited the farm. They organized their own visit and interview with the farmer as part of a group project on agriculture. The purpose was to learn about project work and to gather information through farm visits, interviews with farmers and information searches on the Internet. The groups present their results during an agricultural fair for younger students at the school (Interviews with teacher).

The collaboration is informal and with weak ties between farmers, teachers and, in the latter case, students. The visits focus on place-based learning, where pupils learn about the farm, farm-life and specific production methods on-farm. The farmer does this through a farm tour. Sometimes the farmer also sets up workstations on-farm, where pupils do hands-on activities, e.g. measuring the stable, tasting silage, mucking out the stable or interviewing the farmer (Dyg, 2014). This approach is also seen in farm–school cooperation in other countries, e.g. Germany and Norway.

Table 2. Overview of farm–school cooperation cases.

Type	Relation type	Curricula integration	Cooking and eating	Farm type	Production type	Products (main)	Distance and logistics
1. Single farm visit with pre- and post-classroom integration	Loose, informal and weak ties between a farmer and a teacher	Integration in science by single 3rd grade teacher (urban school). Student-driven projects and agricultural fair (rural school) 8–9th grades	Limited focus on cooking and eating, except some taste of different organic/non-organic products	Part-time Family	Conven-tional *The rural schoolchildren go independently to nearby farms both conventional and organic	Dairy	Accessible by train (approximately 1.5 hours one-way) by urban school and within bike and bus distance of a rural school
2. Multiple visits and organic farmer collaboration	Closer collaboration between several farms and schools, multiple stakeholder involvement	Integration by one or several teachers in Danish, science and math, thematic weeks during a school year or several months. 3–4th and 6–7th grades	Farm-to-table focus involving cooking either on-farm or back at the school. Linked to themes on e.g. healthy eating	Part-time Family and cooperative farm	Organic	Integrated production and Beef	Within walking and biking distance of several schools
3. Science network and closer collaboration between several schools and stakeholders (municipal level)	Close collaboration integrated in school curriculum in participating schools. Multi-stakeholder involvement, integrated in school policy and involvement at the municipal level	Integrated in all 4th, 5th, 6th grade science teaching. Included in the formalized curriculum at the schools. Professional networking across schools.	Farm-to-table focus, incl. taste workshops on different breads, cooking with own crops and collection and cooking of wild foods.	Full-time family	Conven-tional	Pork	School garden on farm in semi-urban area where the farm is brought in. School garden within walking distance of two schools, third school by bus/train.
4. Whole-school approach integrating food and agricultural education with cooking	Connections between annual farm visits, teachers and subjects (science, home economics), school foodservice/canteen, nature guide and part of school profile and policy.	Farm visit integrated in science teaching and home economics in e.g. 3rd grade, with teacher drawing on lessons in school canteen, where pupils cook.	Focus on development of cooking skills and healthy eating in the school canteen. The canteen is 90% organic.	Full time socio-economic enterprise and part-time family farms	Organic	Integrated production and Dairy	Accessible by bus/train (approximately 1.5 hours one way).

There is a formal collaboration with DAFC, providing farmers with compensation for their time. DAFC also provides them with support and advice, including teaching materials before and after the visit. The relation between the farmer and teacher is brief, primarily to prepare and conduct the visit. In some cases, the same teacher or group of teachers return to the farm year after year (Dyg, 2014). The collaboration is described and illustrated as a generic model in Figure 1. In some cases, farmers are invited to schools to give presentations or observe students' presentations of their farm projects.

The opportunities of this cooperation model are that it takes time out of the teachers' tight schedule only once, and that the visit can be integrated in the teaching before and after the visit. Agricultural interest organizations assist with funding to cover the farmer's time, requiring the school to pay only for transport. The challenge for children's learning is that they only get a glimpse of farm life from the brief visit and see only one type of production. Additional visits or use of video to learn about other production types in the classroom is crucial for reaching the full learning potential. To enable children to connect farm visits to academic learning, food system understanding, and hands-on food activities in school, it is important to organize activities before and after the visit. Teachers integrated various food and eating components into their teaching following the farm visit to link the visit to a farm-to-table understanding. Thus, one-off farm visits can be linked to the school foodscape, e.g. through tasting different types of milk or breads in the classroom and talking about where the lunch comes from. However, the foodscape approach is more pronounced in the other collaboration models.

Multiple Visits and Farmer Collaboration

The second model builds on case 2: a network of organic farmers cooperating across

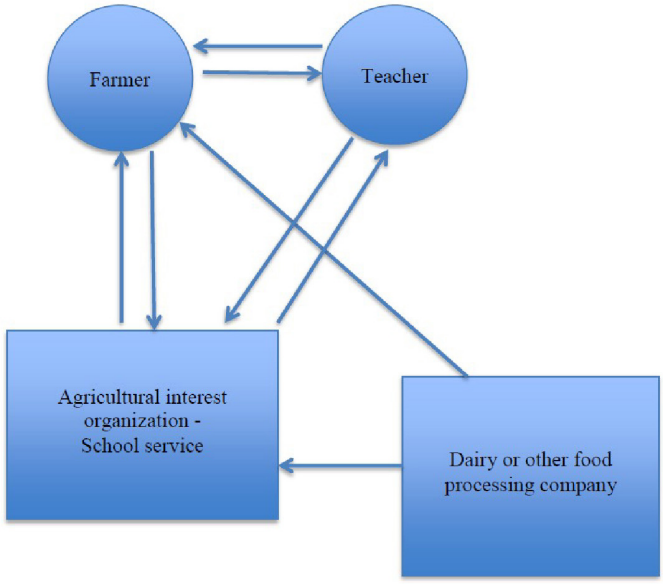

Figure 1. Farm–school collaboration model 1.

the country to promote organic schoolyards, exchange information and seek funding. The case study looks at collaboration between a family-run organic meat farm and a cooperative with an integrated plant and livestock production in a peri-urban community outside a major city in Denmark. The collaboration enables schools to go on several visits to the cooperative and the organic meat farm. The meat farm has cows, calves, horses and fields around the farm with a small pond, birdlife, insects and frogs. The family farm offers half-day tours around the farm including information about ecology, organic farming, cattle, the fields, nature and the pond. The cooperative is a living community, where housing, agriculture, energy production, social development, consumption, waste handling and financial aspects are based on sustainability principles. The cooperative has land available and prioritizes longer educational collaboration, which involve a school garden, where classes can come and participate in farm activities over an entire growing season. The schoolchildren are engaged in activities such as sprouting, planting, weeding, watering, and harvesting the plants as well as cooking activities either outdoors or back at the school, while learning about organic agriculture and ecology (Dyg, 2014). From a more generic perspective, the multiple visits can involve visits to other productions, such as family farms, urban farms and manors.

Model 2 includes a greater number of stakeholders and stronger connections than in case study 1. It is based on a long-term but non-formalized collaboration, between: 1. farmers on educational activities, knowledge exchange and funding; 2. farmers and their organization on funding, development and dissemination of educational materials; 3. schools and the different farms on visits to one or more farms. This model could also involve a local food production company through visits and educational activities to understand production aspects in other parts of the food

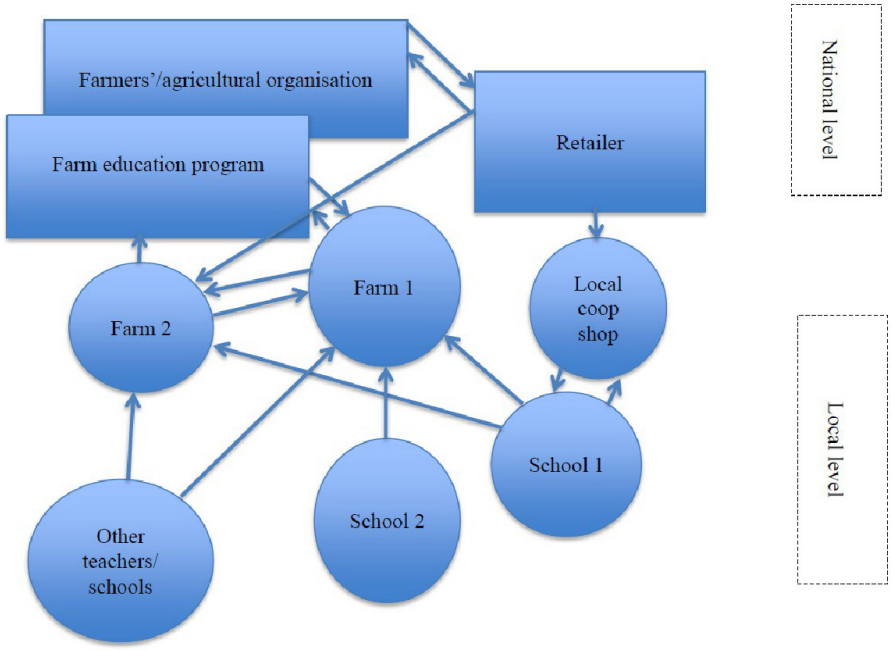

Figure 2. Farm–school cooperation model 2.

chain. In the case study, a retailer at national level and its local branch supported schools with food for their cooking activities.

The opportunities in this model are that it provides more time for hands-on food activities at school (sprouting, cooking, taste workshops) enabling in-depth learning throughout a growing season. Farmers can join forces to ensure that children visit different farms. This model encompasses a stronger school foodscape approach in that the school garden and other on-farm activities are linked to the school food environment: the visits are followed up with making healthy breakfast and lunch at school. This collaboration model can enhance teachers' familiarity with agriculture and improve farmers' teaching skills. One of the challenges is that it requires more time and funds to pay the farmers.

Municipal Science Network and Closer Cooperation between Several Schools and Stakeholders

The third case is a science network between three schools in and around a rural midsized town in collaboration with local farmers and a science centre. DAFC supports the project with consultancy advice and education materials and a large supplier of agricultural inputs provides grain for teaching. There is close cooperation between the science teachers in the three schools, who receive expert advice from a farmer, nature guide, science staff and a plant consultant when organizing educational activities relevant for pupils in fourth, fifth and sixth grades. Activities include workshops for the fourth graders, experimenting with planting potatoes, wheat and corn on a field near the science centre, with assistance from the farmer, his tractor and a plant production consultant. The children learn about different varieties of grain, food quality and health, do sensory experiments and take-home experiments on growing potatoes from potato peel and applying different amounts of water on wheat, which they can follow up on in the classroom. In fifth grade, students water, weed and harvest their crops, pick wild foods with guidance from a nature guide, cook their own corn and potatoes and include wild plants and berries in the cooking. They learn how people ground flour in the old days and how to make butter from cream. The sixth graders do experiments with soil, estimating the content of nitrate, lime and pH value, and do experiments on the effect of over-fertilizing and under-fertilizing the soil vs. applying adequate amounts (Dyg, 2014).

Cooking and food tasting are important components alongside agricultural activities, thus being part of a foodscapes approach. However, this case also does not entail actual provision of school food from the farms, like many farm-to-school programmes in e.g. the USA.

The cooperation involves several stakeholders and multiple interactions between the stakeholders. The core of the collaboration is the coordinator, who acts as a link between the different stakeholders in organizing events. The network enables teachers to exchange information and materials with each other and to receive advice from experts. The science centre is a key stakeholder offering expertise and a physical setting for educational activities. The municipality initiated the network activities, which fit into the municipality's educational strategy of science and business promotion. The strategy could also have been linked up to health promotion, food education or sustainable development, which is the case in other municipalities in Denmark. This multi-stakeholder cooperation is illustrated in Figure 3.

There are a number of opportunities in this model: for teachers to get assistance

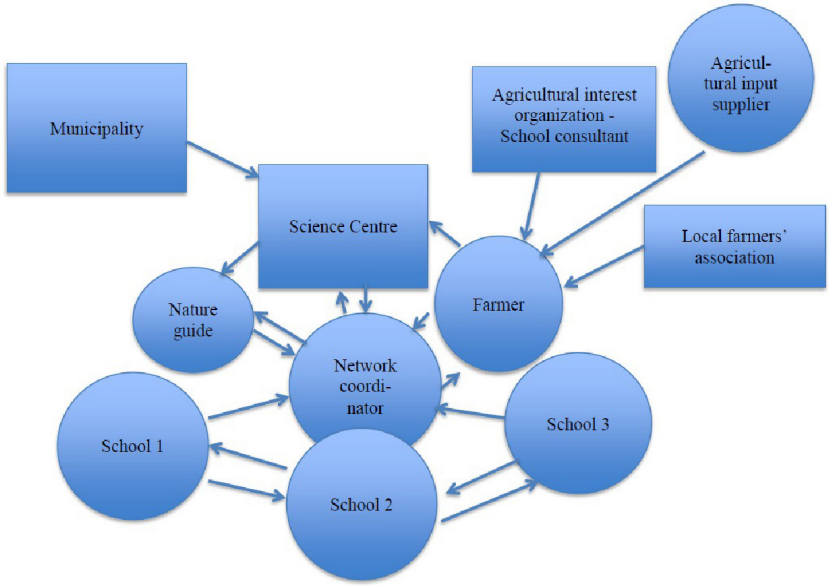

Figure 3. Farm–school cooperation model 3.

from experts when developing and teaching science, agriculture and food to exchanging ideas and equipment with other teachers and experts. The longer-term programme builds up students' knowledge about food, cooking, science and agriculture over three school years ensuring a progression in the children's learning. A similar cooperation model is seen with school garden programmes in Denmark. Yet, cooperation between schools is not yet common. The challenge with this model is the initial top-down approach from the municipality.

Whole-school Approach to Food and Agricultural Education

This case is whole-school approach at a public school located near Copenhagen. During 2004–2005, the school was going through a crisis, which led to the decision to restructure the school. The school now applies a whole-school approach involving experiential teaching, cooking in the school kitchen, school gardening and excursions outside of the classroom, combined with an organic food strategy and food service. The school has 'professional skills days', where teaching is integrated with, for example, professional cooking. The whole-school approach to food involves an organic and healthy school food policy, food education and meals prepared and sold at the school by students. The school's educational strategy aims at integrating theory and practice, free time and play with academic and professional skills. Teachers take the pupils on farm visits to learn about organic farming and to understand the underlying reasons for the school's organic meals policy. The connection with a farm is similar to model 1, a single visit to a farm with integration into the teaching before and after. The school is exemplary of how a school can work with a foodscapes approach, combining provision of school food, food preparation in the school kitchen and educational activities related to food and agriculture.

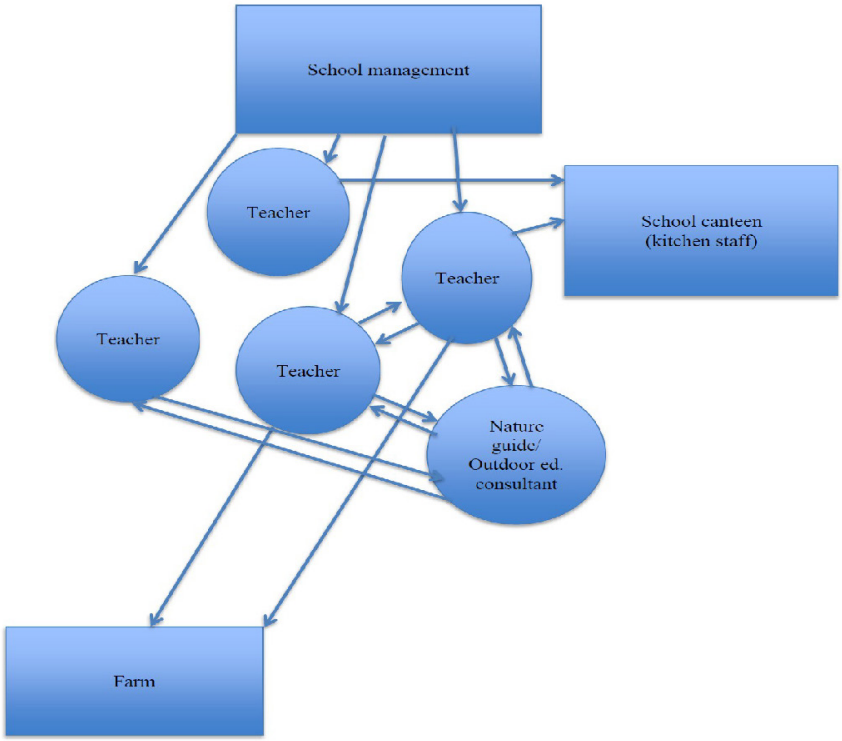

Figure 4. Farm–school collaboration model 4.

This bidirectional cooperation model (illustrated in Figure 4) is almost entirely based within the school. It comprises: 1. the school management initiating the approach, 2. teachers implementing it, and collaborating with staff in the school canteen, 3. a nature guide supporting teachers in developing skills and methods in outdoor pedagogy, and 4. the farm (an organic farm run as a social enterprise in a peri-urban area). This model could have had a stronger connection to other stakeholders in the community than is the case. Although there is no close collaboration with a particular farmer or farm, the teachers prioritize taking students to a farm once a year. This is a good example of a farm-to-school programme with multiple components. The school does not procure food from local farmers, as is the case in the programmes in the USA or Brazil and in recent initiatives starting up in a few municipalities in Denmark (Ruge and Mikkelsen, 2013). School food provision is rare in Denmark, for which reason this model is still in its infancy.

The key opportunities are that students get a broader understanding of food and agriculture and are better able to connect what they learn on the farm, with their school garden and the organic food at school. This means that they are more likely to understand e.g. the seasonality of food when cooking meals and the reasons for the schools' organic meal policy (Dyg, 2014). A key challenge to this foodscapes approach is that it requires support and commitment from school management and teachers and coordination between school management, teachers, kitchen staff and other stakeholders.

The analysis showed that the cases can be categorized into broader models. These

suggested collaboration models can probably also be applied to farm–school cooperation elsewhere. The results from interviews and data from DAFC show that the most common collaboration model in Denmark is the one-day or half-day farm visit with varying degrees of integration into subjects in the classroom before and after (model 1). Some of these visits are characterized as social events with no or limited educational content. The models 2 and 3 are longer and more demanding to establish focusing on experiential education to enable students to follow the production cycle, do experiments or other practical work on the farm or school garden. Cooking activities are often combined with other hands-on activities. In the second type, individual teachers or a group of teachers organize visits to a farm (or several farms) over a growing season. In the third type, schools, even municipalities, have a long-term collaboration with a farmer or school garden project, integrating it into the school policy or science curriculum over a season or several school years. In both models, it is common for students to be actively involved in the field or stable using the farm setting for experiments. It is often combined with cooking activities. Findings shows that farm visits, cooking and other food related activities are linked to objectives of fostering food literacy, agricultural literacy or ecological literacy (Dyg, 2014). The fourth type can be characterized as a whole-school, bidirectional foodscape approach, where provision of food in the school canteen is part of the school's food policy and teaching food and agriculture topics. The educational components involve farm visits, school gardening, cooking and classroom activities. The four typologies derived from the case studies are summarized in Figure 5 (models 1–4).

Figure 5 summarizes this into a model classifying farm–school cooperation. There is a fifth model included here, which was included in the case studies. This model is where a class or individual students go on a farm stay to work for several days or a week to learn about the farming profession and farm life. The reason for not including it is that it is typically not integrated into the subjects in schools but has

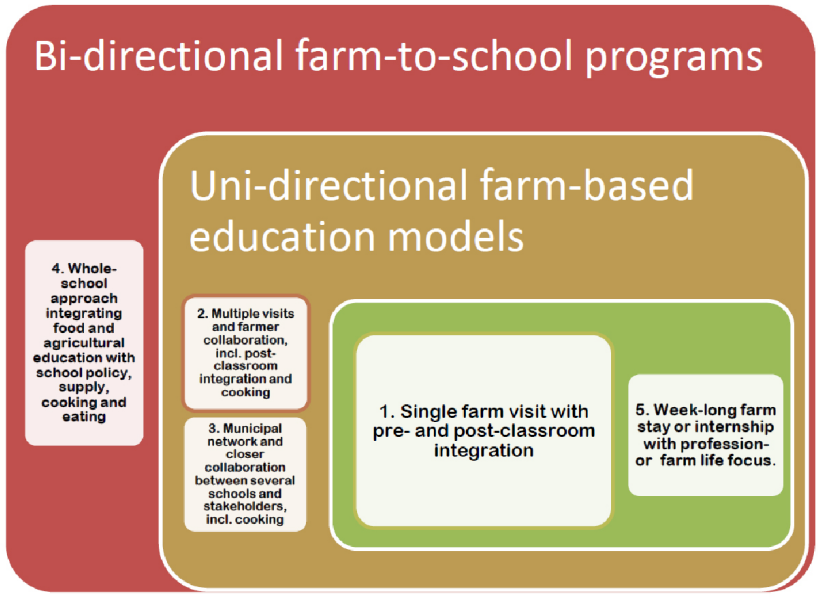

Figure 5. Models of farm–school cooperation.

a stronger profession target for older students. In addition, it has a unidirectional scope with similarities to model 1, except for the fact that the visit to the farm is longer and more in depth than the one day field trip described in Figure 1, and requires a closer collaboration with the farmer. The emphasis was to explore more of the bidirectional types of cooperation.

Teacher commitment can be relatively low in model 1 depending on the level of classroom integration before and after the farm visit. Model 2 requires higher commitment of the teacher in terms of taking students to the farm several times and integrating this with classroom follow-up, although this is not always the case. Some teachers leave most of the teaching up to the farmers, whereas others follow up and work with experiments and reflections in the classroom. Both types of teachers were found in case 2. In models 3 and 4, teacher commitment is high for the programmes to succeed: it requires a close collaboration with the farmer and other stakeholders as well as planning and coordination with colleagues and linking subjects and other activities at the schools. Farmers' commitment is similar to the teachers: the higher commitment and time is required, the closer the collaboration. In model 1, farmers' commitment and teaching competence can be relatively low in terms of only doing a tour and/or providing an excursion place. Commitment in terms of time, motivation and pedagogical goals is stronger, the closer the collaboration, i.e. in models 2–4. Although students' learning outcomes were not studied in this research, closer and longer collaboration will inevitably have a stronger impact on children's learning. This is supported by international research stressing the importance of longer-term and multicomponent food interventions. Short-term programmes are less effective than year-long programmes (Poston et al., 2005; O'Brien and Shoemaker, 2006; Evans et al., 2012).

Objectives and Motivation

The Farmers

For the majority of farmers, it is not economic incentives that motivate them to open up their farms to students. Presumably due to procurement regulations in the EU, low prevalence of school lunch programmes in Denmark and limited focus on schools as a potential market, the farmers did not highlight the economic incentive. An exception was the farmer located close to Copenhagen with easy access to public transportation, which enabled her to take in schoolchildren several times per week to supplement her income. According to DAFC, many farmers do not bother with the registration required to claim reimbursement for their time, especially in sparsely populated areas with only few visits. Farmers regarded opening up their farm to the public as a matter of principle, wanting children to experience the reality of farming and rural living, and to increase the transparency of agricultural production. As a dairy farmer puts it:

> 'I would like to help turn around the negative image that used to be that farmers are grey and boring, that they pollute and destroy the environment, and that they are tough on the animals' (Interview with Hanne).

They highlight the importance of people knowing where their food is coming from and of providing a good impression of agriculture to ensure its continued support in the community and society at large.

The organic farmers also had an overall goal of informing future consumers about organic agriculture, implicitly perhaps with some underlying long-term economic incentives to ensure a future market for organic products. An organic meat farmer in case 2 explains:

> 'I think they [the children] come and would like to learn a lot and they also leave here having gained a lot of knowledge. Some of all that theory they hear about in school is actually understood out here when they see it in real life… It is not right that we have so many people in Denmark who grow up without having knowledge of where food comes from, and I want to also tell them about ecology. About what is involved in operating an organic farm. So about what conditions the cows and the horses live under, and how we treat the soil' (Interview with Anne).

All the farmers revealed a passion for teaching children and opening their eyes to understanding agriculture. They highlighted that they want children to learn and not just have a fun day. The farmers involved in closer collaboration with schools in cases 2 and 3 see their role in an even broader perspective: of offering children a practical experience to learn complex theory in the real world as a key motivating factor (Dyg, 2014).

DAFC's motivation for engaging in educational activities is naturally linked to the motivation of farmers: to foster public support for agriculture, create awareness and increase transparency of agricultural production. The motivation of the organic producers' association has a slightly different emphasis, as organic agriculture has a more positive image in the media and to the public compared to conventional agriculture. Thus, the focus here is on explaining the principles of organic farming and promoting awareness to ensure support from future consumers, and less on defending their production (Dyg, 2014).

The Teachers

Teachers' motivations for engaging in cooperation with farmers vary. However, there are also similarities: one of the biggest being that teachers see the importance of fostering children's food literacy, including an understanding of where their food is coming from. The collaboration offers an alternative, real-life classroom with a number of benefits for children's learning, which the regular classroom cannot. Some teachers mentioned going to a farm helps shape their worldview and life skills. Several believed it is something children will remember later in life. As this teacher explains:

> 'It is more their deep understanding of things. That they remember it for the rest of their lives…, because much can otherwise be learned and then quickly forgotten. But you will not forget such a visit… They become wiser. They get a larger worldview, because they have been out and experienced different things' (Interview with Sanne).

Several teachers highlighted this point, which is supported e.g. by Illeris (2006).

Learning goals of fostering food literacy, agricultural literacy, ecological literacy or a combination were documented to varying degrees (Dyg, 2014). The common focus was on teaching children where and how their food is produced. A broader ethical, social and ecological understanding of agricultural and food systems was

the aim for some teachers and organizations, especially those working with organic agriculture (case studies 2 and 4).

Apart from the uniqueness and effectiveness of learning on a farm and other outdoor environments, teachers' motivation is also related to the importance of learning about agricultural production. This is similar to the motivation of the farmers. One teacher explains:

> 'The children get an insight into what is it about the soil and… into what makes up a farmer, and what it is he needs to do before he can even put something in the soil. And I think there is an incredible amount of professionalism in it, also because they've become much criticized: "but they fertilize too much" and "it flows into our creeks"… And then we have some tests at home that actually show if you apply too much fertilizer then nothing will come up. The plants must get only just as much as they can handle. If they get too much, the plants die' (Interview with Stine).

In other words a strong motivation factor is to foster a more nuanced understanding of agriculture.

Another teacher stresses this point:

> 'We live in the countryside, but there are very few children who know anything about agriculture. It is disappearing more and more… it is changing to large-scale production and small farms are becoming fewer and fewer. So fewer children know anything about it. If you only say "crops", "what is a crop?" They do not know it [laughs]' (Interview with Bente).

The lost and perhaps romantic connection to farming and the countryside is highlighted here. Most teachers are likely to have limited agricultural understanding. A study by Trexler et al. (2000) from the USA found that teachers in general did not feel comfortable teaching agriculture, requesting more support in the form of educational materials and training. This is not the case with the science teachers interviewed in the Danish study. Yet a few other teachers did not feel comfortable teaching agricultural topics putting emphasis on health or organic food more broadly, others used the collaboration with farmers to fill their own knowledge gap. Teachers were also motivated by the academic benefits of farm visits and closer collaboration, working in an outdoor and different learning environment, and by the opportunity to combine academic and theoretical objectives with experiential teaching (Dyg, 2014).

There could be some tension between teachers' academic interests and the interests of farmers, such as in case study 1 focusing on transparency of the production. However, only one teacher mentioned this. Nonetheless, it is likely to affect children's understanding of agriculture in terms of the academic relevance and bias that can be derived from difference in objectives. There is a risk of misconceptions of agriculture, if teachers do not encourage a deeper and critical reflection of the farm experience afterwards.

Even though food literacy is a common motivational factor for farmers and teachers, farmers do not necessarily focus on food, but on their production. Although food is clearly the overarching focus of teachers, the interviews revealed that farmers focus on production details.

Some teachers were hesitant to be interviewed because they were not very familiar with agriculture and science-related issues, for which reason they only had a limited focus on and interest in agriculture in their teaching. When the motivation

of farmers and teachers is limited to only giving the children a fun day at the farm, or driven by the wish to change the image of farmers, there is a risk of children uncritically accepting what they see, hear and read without deeper, critical reflection. The risk of misconceptions of agriculture, when the children meet a friendly farmer and read educational materials from agricultural interest organizations, which do not mention environmental issues and broader sustainability perspectives, is cause for concern.

On a personal level, teachers in case 3 are motivated by the professional network, where they get inspiration and exchange ideas with other science teachers and agricultural experts. One teacher explains:

> 'It's quite amazing that we have such a professional science network, where we can get experts in and can tell them about it, because although we know quite a lot as science teachers, but certainly not one tenth of… yes, one hundredth of what they know. Because they know it and can explain to the kids what it is all about' (Interview with Bente).

Farmers and other agricultural experts are keen on sharing their expertise with teachers and students. The opportunity to work with farmers, local companies and other stakeholders is an important motivating factor for teachers in case study 3. Apart from sensory experiences of a farm visit or longer collaboration, farmers and other experts play a unique role in providing important expert information. Teachers mentioned the importance of farmers being authentic experts able to provide students with clear opinions. The fascination by students of meeting an authentic farmer was evident in all observations.

The findings show that farmers and teachers with a longer-term collaboration also had a strong motivation to make education more experiential, linking theory to practice and giving children new realizations and action competence. Other research shows that longer and multicomponent food interventions (field trips to farms combined with farmers' visits to schools and school gardens) are important for attaining desired impacts on food and agricultural knowledge and behaviour (Poston et al., 2005; O'Brien and Shoemaker, 2006; Evans et al., 2012). For this reason, cases 2, 3, and 4 and to some extent also a student-driven problem-based project in case 1 are of particular relevance, because they are tied to either on-going on-farm activities or combine food and agriculture-related activities, experiments, investigations and classroom teaching, all of which are more conducive to children's learning.

Discussion

The school-garden and urban-agriculture boom spreading in Denmark opens up new and longer-term opportunities for children to connect to their food, not only on rural farms. These new forms of agriculture can enable a stronger connection between children and food in areas closer to their schools, as seen in models 2 and 4, involving respectively a school garden on a peri-urban organic farm and a farm visit to a peri-urban farm run as a social enterprise. Case study 4 documents a broader school foodscape approach and how it can be developed to realize the full change potential of food at school. Foodscape thinking challenges traditional thinking about food, being limited to simple provision of lunch, and takes a more active and learning-based approach.

The study discovered various action possibilities and affordances of the proximal

'food landscape' to be used as a learning scape. It gives attention to the school ethos whereby agriculture, nutrition, life skills, and health are put on the agenda through their common denominator, food. A school foodscapes approach, as in model 4, involves political and cultural elements, i.e. an organic school food policy and values related to cooking and organic food, affecting the school food environment and hence eating at school. The attention of teachers to the learning opportunities in working with food and agriculture in various subjects, further contributes to realizing the potentials of fostering food literacy action competence and academic skills among students (Dyg, 2014). Studies also show that learning opportunities in school gardens offer additional benefits, by providing a foodscape that promotes connectedness to nature, science understanding, as well as social and personal development in children, e.g. interpersonal skills, self-understanding, self-esteem and the ability to work in groups (Murphy, 2003; Desmond et al., 2004; Green, 2004; Wistoft et al., 2011).

Framing farm–school programmes within a foodscapes approach opens up a discovery of new learning potentials in the environment. Whether this is within the school setting or growing food on a farm or in a school garden, it offers possibilities for promoting healthy eating, environmental awareness and food and agricultural literacy. These and academic learning possibilities are discovered by teachers, school managers, farmers and others, when establishing closer external networks and collaboration, combining these with classroom integration and initiatives targeting the school food environment. Studies show that multicomponent interventions are most effective, as they combine the learning potentials in the food- and agri-environment of the farm or school garden with the food reality of the school. (Poston et al., 2005; O'Brien and Shoemaker, 2006; Evans et al., 2012) We also argue here that these learning potentials affect classroom and subject integration and not only the school food environment.

The application of the foodscapes approach to farm–school programmes contributes to a better understanding and analysis of the farm–school programmes, the extent to which these embrace the full learning potentials offered within the food environment at school and the food and agri-environment of the farm. The four suggested farm–school collaboration models realize to varying degrees the potential of the foodscapes approach. The first three models realize to different degrees the learning potentials of the food and agri-environment of the farm, integrating it with subjects such as science, mathematics and languages. Models 2 and 3 work more thoroughly with hands-on food activities on-farm and back in the classroom. Only model 4 integrates the full potentials of a school foodscape: it combines the promotion of healthy eating through cooking and school meals with environmental awareness and food and agricultural literacy from experiential learning on a farm and from classroom teaching.

With the recent school reform in Denmark, many key factors are in place for promoting farm–school programmes, including more teaching hours, flexibility in schedules, alternative teaching methods and cooperation with stakeholders outside the school. Structures to establish canteens, school kitchens and supply locally sourced food is not yet part of the reform and policy. In the USA, federal and state governments/policymakers view the USDA Farm-to-School Program as worth supporting. Policy has been a primary vehicle for developing these programmes at national, state and local level, with a health and nutrition promotion rationale while supporting markets for US farm products. In Denmark, the emphasis on meals, mar-

kets for farmers and school health policy combined with educational objectives is not yet part of a national policy. However, this could be a way forward for stronger integration and provision of school meals to support longer school days and more hands-on teaching under the school reform. School foodscapes approaches are still only the reality in a few schools and municipalities in Denmark. Promoting model 4 more widely across Denmark requires programme and policy support similar to the one in the USA.

Current discussions and research on food at school should take advantage of a broader understanding of food realities at school. We suggest this broader approach to be informed by a foodscapes approach. The Danish school reform refers to the idea of an 'open school' as the creation of stronger links with local community actors, which could include farmers and others. It emphasizes supportive learning strategies in which hands-on learning about food might well be an option. Farm-to-school programmes are a good example that could be used to tap into this potential.

There is a need for more research on broader school foodscapes perspectives documenting learning, health and sustainability outcomes. So far, most research and conceptual papers on foodscapes focus on the organizational and sociocultural aspects of the food environment and related eating practices, although some recognize the curricular and other learning opportunities in school foodscapes (Henderson and Tilbury, 2004; Adema, 2006; Mikkelsen, 2011, 2014; Torralba and Guidalli, 2013). However, the main focus is on eating as a form of learning: learning to participate in collective practice, to become a member of a group and to eat in a context (Mikkelsen, 2011, 2014; Torralba and Guidalli, 2013). Curricular integration and learning about food and agriculture is lacking.

The contribution to uncover these other learning opportunities in foodscapes in and outside the school and beyond eating adds a broader understanding of school foodscapes. Furthermore, the systematization of different farm–school collaboration models can help inform future research on foodscapes, linking school food and farm–school programmes, for example, to investigate whether or not there are particular models that are more common in particular contexts (e.g. social background, countries, institutional contexts, countries with stronger or weaker agricultural traditions, types of schools) or the historical trajectories and evolution of these models.

Conclusion

Farm–school cooperation in Denmark ranges from short-term, informal, unidirectional programmes to longer close collaboration with a bidirectional scope involving a foodscapes approach to food and agriculture education and school food. This approach and related farm–school programmes opens up new potential developments in the environment for promoting healthy eating, environmental awareness, academic learning and food and agricultural literacy among children. The learning potentials embedded in the farm and school food environment depend on farmers' and teachers' motivations and learning goals, and are linked to the nature of their collaboration (shorter or longer-term collaboration). It is also connected to the ability of school managers and municipalities to explore and support the learning potentials of the environments. Thus, farm–school action possibilities are connected to the learning potentials in the food and agri-environment of the farm and the ability to link this to the food reality and teaching at the school. For closer cooperation models and foodscapes approaches to become more widespread, a school reform such as the

one implemented in Denmark combined with policies supporting school foodscapes and procurement of food from local farmers are of key importance.

Longer-term collaboration models are linked to farmers' and teachers' objectives of making teaching more experiential, giving children new realizations and action competence, thus leaving a stronger impact on children's learning about food and agriculture. Longer-term and broader foodscape interventions are likely to have a stronger impact on children's food and agricultural literacy. The study has uncovered learning opportunities in foodscapes in and outside the school beyond eating, which adds a broader understanding of school foodscapes. More research is needed related to this aspect of foodscapes, but also on the relevance of the suggested collaboration models' systematization in other contexts.

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