



## Sustainable Agribusiness in Metropolitan Areas

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# Content

Smart solutions for metropolitan agriculture	3
Metropolitan agriculture: what's it about?	4
Strategies and licences	6
Sustainable business models in the circular economy	8
Assessing the impact of business models	10
Innovation and learning for metropolitan agriculture	12
The future	14





# Smart solutions for metropolitan agriculture

The world over, more and more people are moving to cities. The UN predicts that by 2050 about 6.5 billion people will be living in urban areas. All these people will need sufficient, healthy food. Farmers in the areas around and between big cities – we call their work metropolitan agriculture – will have to produce that food. At the same time, increasing demands are being placed on metropolitan agriculture. Sustainable production methods need to be used: ones that are accepted by the local population and are appropriate for densely populated areas.

To meet the demand for more and healthy food production in a restricted environment we need to develop smart business models and new value chains that include producers and consumers. To develop these we need new coalitions of and collaboration between agricultural entrepreneurs, governments, consumers and other parties, which create new opportunities for the agricultural business sector, locally in other countries and also in the Netherlands.

Van Hall Larenstein University of Applied Sciences created the professorship of Sustainable Agribusiness in Metropolitan Areas in 2012 to link education, research and business practices related to these chains. Rik Eweg was appointed professor in October 2013, bringing his research and public-sector management experience to the group. Eweg: 'We develop the competencies and knowledge needed for sustainable agribusiness in metropolitan areas.'

Starting out small, the group developed gradually and has established 'Living Labs' within which intensive collaboration now takes place. These Living Labs are networks of universities of applied sciences and professional education, businesses and governments, where entrepreneurs, students and researchers learn with and from each other about sustainable metropolitan agriculture. The Living Lab in the metropolitan region around the city of Pune in India focuses on dairy farming. In Romania the Lab looks at fruit, vegetables and dairy farming, and in the provinces of Gelderland and Friesland in the Netherlands the focus is on Circular Agro-Food Business and Nature-Inclusive Farming. Rik Eweg: 'Our role is to facilitate collaboration between different parties, also in other cultures. This requires mutual respect and taking into account the interests of others.'

In 2018, the associate-professorship Environmental Impact of Circular Agro-Food Chains was created as part of the Professorship of Sustainable Agribusiness in Metropolitan Areas to analyse the environmental impact of circular agro chains and food chains. When designing sustainable business models and value chains, impact measurements and indicators of circularity and sustainability are important.

The Living Labs have set up large and small projects in which many VHL students, entrepreneurs and researchers gain experience. Education, research and practice go hand in hand. 'Entrepreneurs benefit from the knowledge and input of students and researchers, while those on the business side provide relevant issues and subject matter for those engaged in education and research.'



**Rik Eweg**

*Professor of Sustainable Agribusiness in Metropolitan Areas  
Van Hall Larenstein University of Applied Sciences*



**Jerke de Vries**

*Associate Professor Environmental Impact of Circular Agro-Food Chains*



# Metropolitan agriculture: what's it about?

## **Project: Taste Academy in the Achterhoek, Netherlands**

Farmers and small and medium food processing enterprises in the Achterhoek, a rural area in the east of the Netherlands, are having to scale up their businesses. They want to meet this challenge by innovating in a number of ways: producing regional products, making their production processes more sustainable, and collaborating in value chains. The entrepreneurs are working with researchers and students in the 'Taste Academy' to find solutions to their problems.

More and more people now live in large cities, especially in developing countries. Metropolitan agriculture needs to be able to feed these people. But what exactly are the features of metropolitan agriculture?

Part of the urban population is made up of a growing middle class that wants high quality food. Professor Rik Eweg: 'This represents an opportunity for farmers to command a higher price for their products, via short chains. Indeed, many farmers do gear their production to this upper segment of the urban middle class, but at the same time the poor who live in the slums also need to eat.'

Urban dwellers make demands as to how their food is produced. On the one hand it needs to be safe, healthy and sustainably produced, but for other consumers it needs to be cheap. Agricultural production also has to take into account societal issues of concern to city dwellers, such as animal welfare and climate change. It is also literally a question of fitting in, as land is often scarce as a result of encroaching construction and roads, and as more claims are placed on water and energy. As a result, much of the farming is intensive, such as greenhouse horticulture or livestock production. At the same time, agricultural work is less attractive than work in the city and this has consequences for the amount of labour available for metropolitan agriculture. Metropolitan agriculture takes place in the areas surrounding, between and in cities. It is distinct from urban agriculture, as it does not necessarily happen within cities.

Metropolitan agriculture faces many challenges, but also offers opportunities for innovation, for example through new technology that is adjusted to a particular situation. Marketing opportunities are created by responding to the wishes of urban dwellers, for example promoting local and regional produce. The professorship of Sustainable Agribusiness in Metropolitan Agriculture works on these challenges and opportunities in a variety of projects.



**Project:  
Living Lab, North  
East Romania**

In the North East province of Romania we collaborate with the University of Agricultural Sciences and Veterinary Medicine in Iasi, the University of Suceava, and development agencies. Topics include developing rural entrepreneurship, improving regional fruit chains, and sustainable and circular agricultural production systems. The Living Lab aims to connect Dutch companies and investors with regional entrepreneurs.





**Project:  
An urban farm  
in Nanded City, India**

We assisted a project developer with the design of a large 77-hectare urban farm in Nanded City (Pune, India), which is part of broader urban development initiatives.

The farm is a mix of fruit and vegetable growing, combined with recreation and residential areas.

# Strategies and licences

‘By gaining an understanding of farmers’ possibilities and strategies, we can offer better advice to producers and governments,’ says Professor Rik Eweg. The strategies are often the result of the interplay between farmers and their environment.

Farmers and other entrepreneurs engaged in metropolitan agriculture are not always automatically allowed to produce. They need to get a ‘licence to produce’ from the government: formal permits or rights. Often they need a ‘licence to operate’ too, which has to do with public acceptance of the way they produce, for example in terms of animal welfare or climate change. Their ‘licence to sell’ is in turn dependent on this: people have to want to buy their products.

Entrepreneurs can adopt various strategies to earn their ‘licences’. One of these is valorisation: earning more for a product by increasing its value. This is usually linked to a product being of higher quality, or involves marketing it as organically produced, or locally produced. Ard Schoemaker, lecturer in Market Access and International Development Management at Van Hall Larenstein: ‘Valorisation requires the development of a chain, for cooperation and for reliability and traceability of a product.’ Another strategy is diversification, for example farmers who extend their farm activities to include non-farming activities such as a campsite. The final strategy is to engage in a sustainable form of intensification, where the farmer produces more on less land or with fewer animals.

‘It’s important to realise that farmers don’t choose a strategy in isolation,’ says Schoemaker. ‘The opportunities that farmers have arise from an interplay between farmers and consumers, citizens and government. A farmer takes chances within this context.’



## Valorisation

The Raak dairy project in India is about valorisation. A farmer can earn more by producing better quality milk or by going over to organic production from local breeds. Valorisation can also be about intensification as a result of making production more efficient through new technology, improved animal accommodation and improved livestock breeds. But from the project it emerged that farmers were only likely to start keeping a different breed if influential people in the surrounding area, whom they were dependent on, encouraged them to do so.

The farmers in the Achterhoek area in the east of the Netherlands also choose their strategy to some extent based on factors in their environment. Ben Rankenberg, coordinator of the Animal Husbandry Bachelor programme: 'Farmers in the region collectively want to develop short chains for delivering regional products to urban consumers. For this they want to develop new chains that connect producers with meat and dairy processors, with restaurants, and with retailers and festivals. For marketing their products, they want to develop storylines that reflect the identity of the region.'

## Project: Dairy cattle in Baramati, India

There are many dairy farms in Baramati, a town close to the big city of Pune in western India. Financed by SIA-RAAK, the Professorship set up a dairy cattle project together with businesses and researchers in Baramati. Several Dutch companies are also involved. The business models used by Indian farming families were analysed to see how they could improve their cattle breeds and introduce adapted cowsheds, improve their farming techniques and make their marketing smarter, where possible with technological support from the Netherlands. The project contributed to the development of the Indo-Dutch Centre of Excellence for Dairy in Baramati.



### Project: Proteins from duckweed

Consumer demand for sustainable, vegetable-based proteins is growing. The 'duckweed' consortium consists of greenhouse growers, processing companies, a Dutch municipality and Van Hall Larenstein University of Applied Sciences. Together we are developing the duckweed protein chain, which represents a new, sustainable business model for growers and producers of vegetarian snacks in the horticultural area between Arnhem and Nijmegen in the east of the Netherlands.

# Sustainable business models in the circular economy

All our research activities aim to contribute to the United Nations Sustainable Development Goals (SDGs). Although most of the SDGs are interconnected, we selected four as our main focus. The business models developed in the projects will outline how they contribute to these SDGs, using specific criteria and indicators. Business models in the circular economy aim to retain a product's added value for as long as possible, if not forever.



## SDG 2: Zero hunger

In the Climate Smart Dairy Farming project in Kenya and Ethiopia, we develop, together with other partners, business models designed to reduce greenhouse gas emissions of small and medium dairy farmers. These models will make the farmers more resilient to predicted changes in regional weather conditions and thus improve food security.

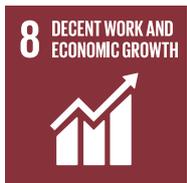
This is an example of how our projects aim to increase productivity and production in a sustainable way. We do this by developing new business models and value chains that fit into circular agro-business, using innovative technologies and methods. The business models are context specific, taking into account local culture, weather conditions, and availability of resources such as water and energy. Agricultural practices should help to maintain ecosystems, strengthen capacity for climate-change adaptation, and improve land and soil quality.



### **SDG 3: Good health and well-being** **SDG 11: Sustainable cities and communities**

For people living in metropolitan areas, health and well-being means having enough nutritious food, whether they are rich, middle class or slum dwellers. To improve health and increase sustainability we need to reduce hazardous chemicals emissions; air, water and soil pollution; agricultural contamination; and the use of antibiotics in dairy farming.

In projects in India, new horticultural and dairy value chains provide more healthy proteins and vitamins to urban consumers in a sustainable way. In the horticultural sector the aim is to reduce the amount of pesticides used on fruit and vegetable crops, and in the dairy sector reducing the use of antibiotics is important.



### **SDG 8: Decent work and economic growth**

Economic growth needs to be decoupled from environmental degradation. In a greenhouse area in the centre of the Netherlands, new technologies extract protein from duckweed, which is used as an alternative to animal proteins in snacks. The new business brings economic development in the area and is an example of how economic growth in agriculture can be brought about by raising production through diversification, technological upgrading, innovation and value-addition. Business models also need to be inclusive: they should include women and offer young people economic opportunities in the agri-food business. In rural areas of Romania, the population is ageing as young people leave because of the lack of job prospects. In our project in the North-East Province, we focus on developing vocational and practical training centres for young men and women who want to pursue a career in agriculture.

### **Project:** **School meals, India**

Important nutrients are missing in many school meals in India. These meals are often made by women's groups. The project helps them to set up collaboration with farmers cooperatives, so they can access better ingredients.





### **Opportunities for circular dairy systems in Brazil**

The dairy sector in Minas Gerais, Brazil, is an interesting market for Dutch companies wishing to support the sector with Dutch technology and knowledge that can help reduce greenhouse gas emissions. However, a study done by the professorship revealed some obstacles that are likely to hinder this form of trade, and which companies should take into account. These include a heavily bureaucratic system and corruption. In addition, farms in Brazil are much smaller than those in the Netherlands, so Dutch technology will not necessarily be suitable. Dutch investors should also look for ways to maintain existing sustainable traditional production practices.

# Assessing the impact of business models

Developing business models and value chains that aim to contribute to the Sustainable Development Goals requires criteria, indicators and tools to assess the sustainability of the business models.

Jerke de Vries is associate professor of Environmental Impact of Circular Agro-Food Chains and focuses on analysing the environmental impact, by applying indicators for measuring circularity and environmental sustainability of business models in the agro-food sector. Screening for environmental impact and Life Cycle Assessment (LCA) of (circular) value chains are core activities.

De Vries is project leader of the VHL activities in the EU-Interreg project BIOCAS, a project developed by the Province of Friesland, with partners from the Netherlands, Denmark, Germany and Belgium. BIOCAS is about smart cascading of biomass for use in various applications, such as extracting proteins from biomass for use in human and animal consumption, extracting sugars and carbohydrates for use in biopolymers or energy production, and extracting nutrients and organic residual material for soil improvement. For this, different chains and production techniques need to be cleverly linked. The goal of BIOCAS is to (co-)develop these chains and analyse their sustainability.





### **Food Valley**

In the Dutch Food Valley region we collaborate with entrepreneurs, municipalities and RaBo Bank in the Circular Economy Food Valley programme. The participants are developing a Living Lab for circular innovations in products, production methods and markets, capitalising on experiences of knowledge institutes and businesses elsewhere.

### **North West Friesland**

In the North West Friesland Living Lab, various working groups composed of farmers and other entrepreneurs, societal groups and knowledge institutes collaborate to develop new product-market combinations for a local circular economy. The professorship participates in the working group for recycling organic manure.





## Competencies for companies

The work that the professor and the lecturer-researchers perform within the Sustainable Agribusiness in Metropolitan Areas professorship results in lessons about the competencies and skills that Dutch and international entrepreneurs need to be able to work in metropolitan agriculture.

Rik Eweg: 'Companies need a development-oriented attitude: they need to be prepared to develop their own market and to adapt their product to that market.' That requires patience and a realistic view of the opportunities and limits, based on a good analysis. The willingness to train people who are going to work with your product is also important. 'It requires commitment to a country, not just the business itself.' If a company is planning to invest in another country, it needs to develop a long-term vision of that investment and of its strategy in that country.

'Entrepreneurs planning to invest abroad need to realise that they will run into challenges. You have to embrace that, because you can learn from these experiences.' At the same time, researchers, government and other stakeholders must not forget that the bottom line for entrepreneurs is making money.

# Innovation and learning for metropolitan agriculture

In many countries research, education and practice still take place largely separately. The Living Labs that the professorship of Sustainable Agribusiness in Metropolitan Areas has developed are networks within which businesses, government and researchers learn to work together towards solutions. The professor and the lecturer-researchers are the facilitators.

Since its inauguration, the professorship has built these unique networks – the Living Labs – for action research, shared learning and the development of skills for entrepreneurs. The Living Labs are based on the close and personal relationships between Van Hall Larenstein University of Applied Sciences and a number of universities and other higher education institutions in other countries: in India, the College of Agriculture and Allied Sciences, Baramati; in Romania, the University of Agricultural Sciences and Veterinary Medicine in Iasi, in Brazil, the Federal University of Viçosa. The lecturer-researchers maintain relations by making frequent visits to these, and the many students who participate in the Living Labs for their research strengthen the relations. The professorship's smaller projects revolve around the studies that the students carry out, supervised by lecturer-researchers who contribute their own expertise and experience. Larger projects involve research that the professor and the



lecturer-researchers conduct in collaboration with local businesses and researchers from local colleges, together with work done by students. The professorship brings stakeholders together and inspires entrepreneurs, governments, local researchers and others to work together to develop new chains and new business models. Rik Eweg: 'We don't offer researchers ready-made research proposals. They have to think with us about their input and how it will contribute to innovations being put into practice. On the other hand, entrepreneurs also have to think for themselves about how they organise their business model. It's often about creating new markets, not just about selling existing products.' For many students and teachers in other countries, learning from the real world outside the school walls is still a new idea, and a university of applied sciences like Van Hall Larenstein has a lot of experience in this.

The professorship has built up solid experience in setting up Living Labs and collaborative learning in the field. Marise Haesendonckx, coordinator of Agribusiness and Business Administration: 'One of the lessons is that cooperation must always benefit all parties.' Professor Rik Eweg adds: 'Start by considering the interests of another party and only then consider how you yourself stand to gain.'

The Netherlands is famous for its consensus-based decision-making, says Eweg: parties with different interests consult and work with each other. 'We translate this way of working into the Living Labs: those in the networks learn collaboratively, and we develop competencies so that students and entrepreneurs can come up with smart solutions for sustainable agribusiness in metropolitan areas.'

### **Project: Climate Smart Dairy Farming in Kenya and Ethiopia**

The professorship leads this project – funded by NWO (Netherlands Organisation for Scientific Research) and in association with CCAFS (Climate Change, Agriculture and Food Security), a global programme of CGIAR – to identify climate smart technologies that are suited to the dairy business models of farmers in Kenya and Ethiopia. The aim is to create scalable, smart dairy business models that result in lower greenhouse gas emissions, are resilient, and devote attention to the inclusion of women and young people. In the project we collaborate with consultancies, NGOs and regional universities.



# The future

## Why we do what we do

Our work is to inspire new forms of learning for students, by inviting them to participate in solving problems and working with lecturer-researchers, entrepreneurs, governments and civil society organisations. In our vision, learning is not a one-way transfer of knowledge, but a joint activity of all partners involved, in which each participant has a valuable contribution to make and can also develop him or herself.

Our activities are intended to contribute to making food production in and for metropolitan areas more sustainable. We see family farmers and small to medium-sized enterprises (SMEs) as the frontrunners in innovation and renewal. More than 500 million family farmers produce over 80% of the world's food. SMEs are where new ideas and new enterprises are developed, and they are the partners of other local SMEs, often acting as path-breakers for or together with larger, international businesses.

In our view, the big challenge for these family farmers and SMEs is to develop new forms of business and entrepreneurship within an urbanising environment, a globalising world market and under conditions of climate change. We take both producers and consumers as a starting point.

## How we do this

As a group we work according to the principles of action research: together with stakeholders we analyse the problem, and develop and evaluate solutions. We develop prototypes and implement innovations based on their usefulness and the wishes of partners in the field. We work together with partners in Romania, Serbia, India, Brazil, Ethiopia and Kenya.

We commit ourselves to long-term involvement in regional networks called Living Labs in these countries. Trans-disciplinary collaboration and learning is based on trust, good relations and familiarity with local cultures and socio-economic relations. Where possible we mobilise expertise and technology from Dutch companies and knowledge institutions to address the regional challenges in the Living Labs.

In the coming years we intend to focus on the following themes:

1. Sustainable business models and circular value chains for food products (dairy, fruit, vegetables). For example, Climate Smart Dairy systems, reducing food loss and creating post-harvest chains, and integrating biodiversity into agricultural production systems.
2. Metropolitan Dynamics: food for Mega-Cities and Refugee Cities for different market segments, such as the middle class, slum dwellers and refugees. For example, artisanal products and short regional chains, value added products, plant-based nutrients/proteins, vertical farming.

**Living Labs:**  
“Physical regions or virtual realities in which stakeholders form public-private-people partnerships (4Ps) of firms, public agencies, universities, institutes, and users all collaborating for creation, prototyping, validating, and testing of new technologies, services, products, and systems in real-life contexts.”

(Westerlund and Leminen, 2011)



3. Creating Impact: Innovation Platforms such as the Value Chain Field School for impact and innovation for research and education in Living Labs. Impact monitoring by translating SDG-indicators into operational indicators to obtain societal 'licenses' for business models (certification, green investing, policy, marketing), for example with the help of Life Cycle Analysis and Environmental Impact Assessment.

### What we offer

Through our research projects we develop sustainable business models for entrepreneurs seeking to build new chains that enable farm products to be produced in a sustainable way. Together with entrepreneurs we design the necessary expertise, technology and chains. We also establish contacts and together with stakeholders set up the chain to urban markets. In the Living Labs we work mainly with medium sized agro-entrepreneurs in the region. Our Dutch partners also have access to our networks in the Living Labs and together with them we develop new business prospects, many involving the export of Dutch technology and expertise, linked to regional opportunities. Our activities enable us to offer our partners:

- The possibility to learn jointly and develop new knowledge and skills in international, multi-cultural networks in the Living Labs, often with young people and unexpected partners;
- Practical and workable solutions to real-world problems;
- The development of sustainable business models for markets.

We invite entrepreneurs, students, governments, knowledge institutions and civil society organisations to work and learn together with us from a basis of mutual respect for all parties involved.

### More information?

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This brochure is based on a workshop in which Professor Rik Eweg discussed the results and plans of the professorship with the Van Hall Larenstein lecturer-researchers involved in the research group:



**Marco Verschuur**, coordinator of the Master's in Agricultural Production Chain Management



**Ben Rankenberg**, lecturer in Dairy Farm Management and Entrepreneurship



**Pauline Drost**, lecturer in Agribusiness



**Ard Schoemaker**, lecturer in International Development Management - Specialisation Market Access



**Sebastiaan Masselink**, researcher New Business Models



**Josianne Cloutier**, lecturer in Sustainable Horticulture/Post-Harvest and coordinator of the 2+2 programme VHL-Baramati Agricultural College



**Jerke de Vries**, Associate Professor Environmental Impact of Circular Agro-Food Chains



**Robert Baars**, Associate Professor Dairy Value Chains.

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