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Protein cluster to speed up national co-operation – Ecosystem model as a practical implementation

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Preface

Work has been carried out on improving the usability of alternative protein sources in many research and development projects. In this project, we started examining protein self-sufficiency and the functioning of the plant protein value chain from the ecosystem perspective and building a cooperation network that would promote the functioning of Finnish plant protein value chains.

Our goal was to create an open cooperation model so that information and opportunities for cooperation could be found in one place.

This vision was also signed by the Ministry of Agriculture and Forestry, which has funded the project, and the Finnish Cereal Committee (VYR), whose networks and know-how have been of great benefit to the progress of the work. It has been a pleasure to see how much we have been able to involve different parties in a short time and to witness the increased interest in the functioning of the protein cluster. In the future, we hope to get the whole chain even better at the same table to develop the sector in the same spirit as we have started in the autumn workshops. Thank you to everyone who so far has given us time and thought to build a good operating model.

Summary

In autumn 2020, the Ministry of Agriculture and Forestry, the Finnish Cereal Committee (VYR) and VTT Technical Research Centre of Finland launched a project aimed at activating the national network of actors and creating a cooperation model, a national protein cluster, that would enable the development of more efficient primary production, manufacture, distribution and use of plant protein products. The project utilised the Food and Beyond ecosystem, and the work started by assembling a cooperation group consisting of experts from various branches of the food sector in a versatile manner. At the beginning of the project, the main challenges of the plant protein value chain were outlined by means of an ex ante survey in which the experts gave their views. The experts also participated in two workshops that worked on an interactive platform, making use of Finland's opportunities and challenges in the plant protein value chain, and in particular how and with what kind of a cooperation model it would be possible to solve the challenges and bottlenecks identified. The potential challenges of the selected cooperation model, the protein cluster, were also discussed with experts, and it was outlined how to make the cooperation work and achieve the objectives. The cluster is an initial form of action, as it also enables participation in international EU cluster activities.

In summary, both the preliminary survey and the workshops indicate that creating new networks, partnerships and ideas, increasing the profitability of the value chain and increasing the awareness and appeal of plant protein products were considered the greatest opportunities in the protein cluster. In addition, increasing international exports was identified as a shared intent. Possible changes in the operating environment and resources, differences of views and lack of trust between actors, and the possible difficult use of the operating model and platform were perceived as potential challenges.

The most important output of the workshops was the construction of a shared vision, which was used by VTT to outline a roadmap for future cooperation. The next step is to create a clear operating model, one of the objectives of which is to increase trust between actors within the protein cluster. The establishment of the cluster will take place in spring 2021, and the objective of the activities is to develop concrete solutions based on the vision and roadmap. The purpose of the protein cluster is to increase Finland's potential to become a significant exporting country of plant protein products. The project and the resultant protein cluster are also an important part of achieving Finland's climate and carbon neutrality targets, in which food sector measures, including increasing the self-sufficiency in plant protein, plays an essential role.

1 Background

1.1 Food system as part of achieving Finland's climate and carbon neutrality targets

In 2020, the Ministry of Agriculture and Forestry launched a climate food programme, which will be accelerated by the government's goal of making Finland carbon neutral by 2035. The objective of the climate food programme is to promote climate resilience in the food system. The objective of the climate food programme is to develop social, economic, ecological and cultural sustainability. In its sustainability and carbon neutrality roadmaps, the food sector is the first in Finland to define measures for actors in the entire value chain for achieving the emissions targets. The climate food programme focuses more on the post-field chain. The basis of the carbon neutral food system is to increase the consumption of plant products and fish that are in season, utilising by-products, reducing food loss and reducing consumption of meat and milk products (Ministry of Agriculture and Forestry, 2020). The domestic food system must be strengthened in order to achieve the climate objectives. In order to achieve these objectives, the entire food system must work together.

1.2 Current position of plant proteins in Finland

In Finland, the position of plant proteins as a source of food protein is increasing at an accelerating pace, but the market for plant protein products is still developing and exports are low (Heikkilä, Rokka and Tapiola 2019, Luke 2020b). By quantity, the largest source of Finnish plant protein is cereals (Figure 1) (Heikkilä, Rokka and Tapiola 2019, Luke 2020b).
The combined share of peas and faba beans in crop production was 1.3% in 2019. Leguminous crops can have up to four times the protein content of cereals and generally contain more essential amino acids, which is why leguminous crops have high potential as raw material for plant protein products.

Of the total amount of oats and wheat used in Finland in 2019 (including imported cereals), approximately 60% on average was used as feed (Luke 2020a). In 2019, a total of 2.07 million tonnes of oats and wheat were produced in Finland, and feed use accounted for 40% of it. There are no reliable statistics on leguminous crops, but it is estimated that feed use will constitute an even larger proportion than with cereals. Around one third of both oat and wheat production was exported (Luke 2020a).

The production volumes of leguminous plants have increased in Finland in recent years. On the other hand, talk of increasing the cultivation and use of leguminous crops is not yet significantly reflected in the market situation (Makery Oy 2019).

When comparing the total production of crops, the volumes of plant protein ingredients and food products in Finland are relatively small. In 2017, the total volume of vegetable protein products in Finland was 0.85 million kg, and it is estimated to rise to 1.43 million kg in 2021. The value of the market for plant protein products in 2021 is estimated at EUR 31 million (Makery Oy 2019). In feed, the self-sufficiency in botanical supplementary proteins in Finland was about 24% in 2018 (Niskanen and Niemi, 2019). The increase in the yield of Finnish protein crops would support the improvement of self-sufficiency and would enable growth in the production of plant protein products and the development of markets and exports.

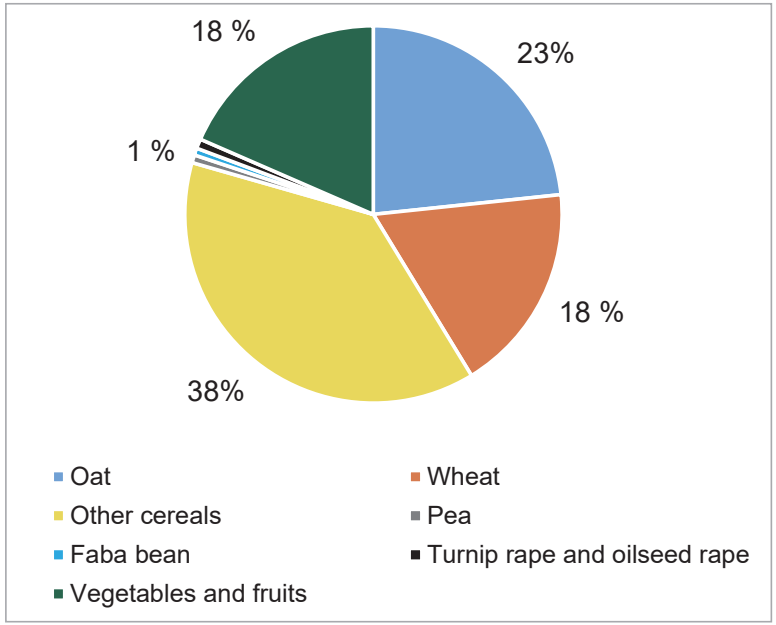

Figure 1. Distribution of yields of the most important crops in Finland in 2019 (Luke 2020b).

2 National protein cluster

2.1 Background

The national protein cluster is based on background work carried out by the protein working group (Nordlund and Vilppula, 2019) of the Finnish Cereal Committee (VYR), the climate food programme of the Ministry of Agriculture and Forestry (Ministry of Agriculture and Forestry, 2020) and several national research and development projects focusing on plant proteins and food systems. Based on this background work, and using the expertise and tools of the Food and Beyond ecosystem (www.foodandbeyond.eu), the Ministry of Agriculture and Forestry, VYR and VTT launched a project in autumn 2020 aimed at activating the national network of actors and creating a cooperation model, a national protein cluster, that would enable the development of more efficient primary production, manufacture, distribution and use of plant protein products. The purpose of the protein cluster is to strengthen the value chain of plant proteins as a whole, from primary production to the consumer, by creating a multidisciplinary network containing actors from the entire value chain of plant proteins.

2.2 Implementation

The compilation of the national protein cluster began in October 2020 with the compilation of an expert group and a preliminary survey of the biggest challenges. The expert group consisted of representatives of the food industry and food research as well as representatives of catering services and primary production. Two workshops were held in November 2020, where experts gathered together to categorise challenges and ways to solve challenges (Figure 2). The preliminary survey and workshops focused on plant proteins intended for food use, as they play an important role in developing protein self-sufficiency and its structure.

Prior to the workshops, participants were asked to respond to an advance survey in order to set the objectives of the workshops. A total of 30 participants responded to the advance survey, most of whom were from the food industry or research institutes. Based on the survey, primary production, lack of further processing of raw materials and consumption habits proved to be the biggest challenges in the entire value chain. It was perceived that the challenges of primary production were due to the low profitability of the production, the lack of know-how of farmers and the lack of suitable varieties. Industrial problems were found to be due to primary production (no domestic raw material available)

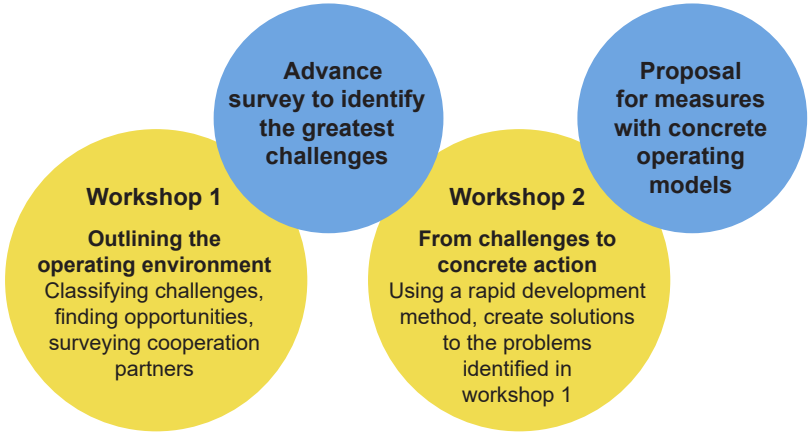

Figure 2. Working model for the project aiming to assemble the protein cluster.

and lack of further processing of raw material. Other problems raised were the high price and inadequate quality of the raw material and the lack of information on available operators. Trade and food service providers felt that there are quite a lot of products in the market but they are similar in type, and that demand for the products was inadequate. In addition, 43% of the respondents felt that the marketing of plant protein products was insufficient. With regard to consumption habits, the greatest challenges were found to be the lack of know-how in food preparation and the taste, composition and price of the products (Figure 3).

The workshops were organised in November 2020, and the following were set as objectives of the workshops: 1) bring together actors and specify which stakeholders should be included in the cluster, 2) identify challenges and opportunities for cooperation, and 3) come up with ideas for a plant protein cooperation model and find ways to commit actors. Both workshops had approximately 30 participants, and the method used in the workshops was the visual Mural workspace (www.mural.com), where each participant was able to participate in the brainstorming.

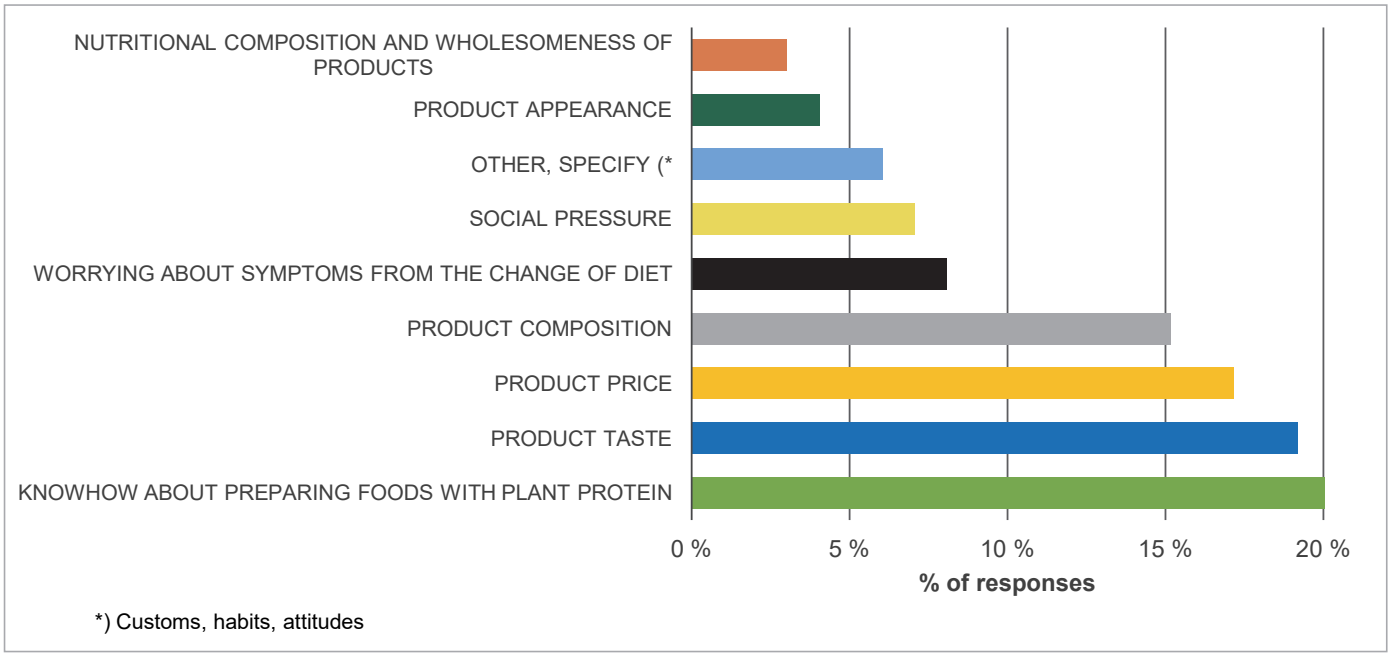

Figure 3. Advance survey results (N=30) on the most challenging problems in consumer habits.

The workshop aimed to use methods that engage all participants in the workshop. This has been a challenge especially in virtual workshops.

The tasks also led to the solution of challenges by seeking analogies in other industrial sectors and helped to perceive the issue from many different angles. The participants in the workshops had some turnover, but most of the invited participants participated in both workshops. The first workshop initially identified the types of stakeholders that should be included in the protein cluster and divided them into primary, secondary and tertiary stakeholders. Next, the possibilities and challenges that the cluster could offer to its stakeholders were considered. At the end of the workshop, four main challenges were selected, based on which vision expressions were created by developing questions along the lines “How could we...”. In the second workshop, we selected two vision expressions from the first workshop, on the basis of which the participants started building a concept for the protein cluster.

The actors forming the protein cluster were divided into primary parties, parties that support the activities and cross-sectoral parties (Figure 4). On the basis of the workshop, it was found that the cluster should primarily include parties with a significant role in the value chain, namely farmers, further processing, industry and consumers. The parties supporting the activities, on the other hand, would include different organisations, associations and funding providers. Cross-sectoral and market-shaping entities include various political, health and environmental actors, authorities, the media, and related industries and technology manufacturers.

After mapping the network of actors, the possibilities and challenges of the protein cluster were considered. Possible changes in the operating environment and resources, differences of views and lack of trust between actors, and the possible

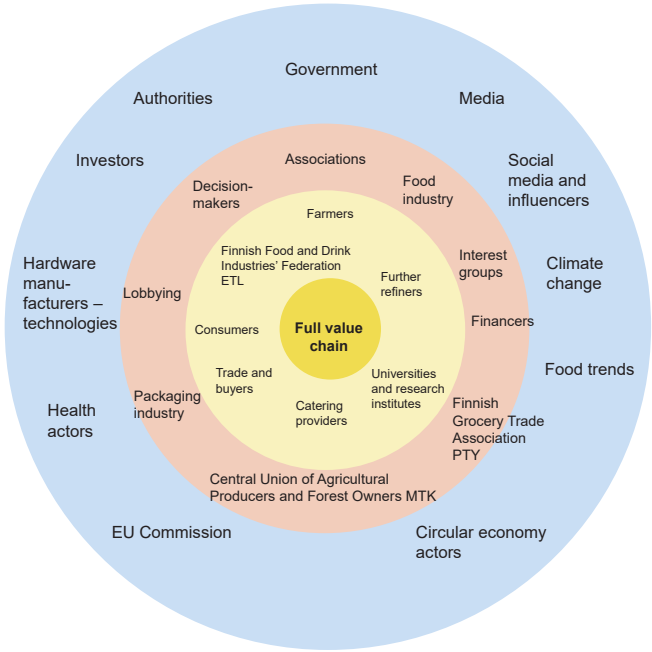

Figure 4. Participants in the protein cluster. The primary level contains the most important actors in the entire value chain from the field to the table. The secondary level has parties supporting or promoting the activities. The tertiary level shows parties crossing sectoral boundaries and shaping the general market.

difficult use of the operating model and platform were perceived as potential challenges in the cluster. Perceived opportunities were the creation of new networks and partnerships, increasing the profitability of the entire value chain, increasing the appeal and awareness of plant protein products, creating new innovations and project ideas, increasing information sharing and communication, and generally increasing cooperation between actors throughout the value chain.

Creating ideas for the protein cooperation model began by specifying the vision expressions: 1) *"How could we enable profitable growing and refining domestic raw material?"* and 2) *"How could we grow the market for plant protein products in a positive spirit?"* Based on the visions, a concept was built for the future protein cluster, and consideration was given to how to make the concept work. The main solutions of the first vision were the creation of networks between the various actors in the entire value chain, as well as the importance of funding, exports and branding. With regard to the second vision, the growth of the market for plant proteins, it was considered that it would be important to start boldly challenging established ideas and operating models, both in Finland and internationally, and to involve consumers and also cooks in creating ideas. After the concept was created, the prerequisites for commitment were examined. The participants felt that commitment to the protein cluster was conditional on a clear vision and activities, a long-term approach, enthusiasm, a good spirit, opportunities for cooperation, openness and information sharing.

2.3 Proposed form of activity for the protein cluster

Based on background studies and workshops, there is a clear demand for the protein cluster from companies, research bodies and other stakeholders. It is therefore proposed that VYR, the Ministry of Agriculture and Forestry and VTT, together with the actors in the protein cluster, start developing activities based on the results of the workshops. The work will begin under the Food and Beyond ecosystem, as it has been based on a perspective that takes the whole Finland's point of view into account, and this was also recognised as important in the project workshops. The aim is to establish a cluster under the Food and Beyond ecosystem, focusing on strengthening the operating conditions of the entire value chain of plant and alternative proteins. Important partners in this work will continue to be VYR and the Ministry of Agriculture and Forestry as well as the protein sector's network of operators

from the field to the table. Food and Beyond is an open national ecosystem designed to help the Finnish food system grow and develop towards a sustainable future. The most important task is to enable growth by offering different forms of cooperation in order to achieve faster development. Instead of working as a project, the ecosystem aims to develop the Finnish food system in the long term.

VTT prepares a cluster agreement together with those parties that wish to participate in the activities.

The cluster is an initial form of action, as it also enables participation in international EU cluster activities. Clusters have been a form of funding used in the EU, where joint funding is sought by a consortium consisting of several EU countries. In the transition to the current Horizon Europe programme, the continuity of cluster funding has not yet been ensured, but if it continues, calls will be opened for challenges compliant with the EU's Farm to Fork strategy. Increasing the use of plant and other alternative protein sources is in line with this strategy.

The aim of creating the operating model is to establish trust among actors and an operating model in which all participants in the cluster benefit from the activities. VTT's ecosystem competence (Valkokari et al. 2020) and operating methods will be used in creating the operating model.

In principle, it has been thought that the allocation of resources for the activities will be based on the members' own work contribution and on covering the costs of the activities (e.g. workshops, communications, cooperation platform) with an annual fee. This naturally requires a commitment to the cluster from its members, but this is also the intent: a committed, active cooperation network will take things forward effectively. Funding for larger research and development projects will be sought from suitable financing instruments.

2.4 Operational objectives of the cluster

The objective of the protein cluster is to increase the home and export markets for plant and other alternative protein sources, and thus to generate significant export products from protein production, products and technology for Finland. At the same time, Finnish food production is nearing its sustainability targets. Solving the challenges of primary production plays an important role in achieving this goal.

Based on the advance survey and workshops carried out during the compiling of the protein cluster, the greatest opportunities and objectives of the protein cluster were found to be increasing the profitability of the value chain and increasing the awareness and appeal of plant protein products. Although the advance survey and workshops focused on plant proteins, the objectives can be generalised in accordance with the climate food programme to improve protein self-sufficiency also for other alternative protein sources.

Increasing international exports was identified in the workshops as a shared intent. In the protein cluster, measures that do not violate competition law can be taken together to promote exports. The availability of domestic ingredients and food products as well as the related challenges are also a matter that concerns everyone and for which solutions are sought. Therefore, an important objective is to enable more efficient primary production, manufacture, distribution and use of plant protein products.

The objective of the protein cluster is also to collect information so that research data, events and open publications can be easily discovered by everyone. At the moment, companies must be well networked and know where information is available. This may have been an obstacle particularly to smaller and newly established operators.

The greatest challenge in the workshops was the lack of trust, which is why one of the objectives of the protein cluster is to increase trust between actors and an operating model that prompts/increases trust. In order for information to be shared, there must be confidence that this will bring more benefits than keeping information to oneself: sharing gives one more than one gives out.

3 Roadmap and action plan for achieving the objectives of the protein cluster

3.1 Roadmap

In order to achieve the objectives of the protein cluster, a roadmap (Figure 5) has been outlined based on background studies and workshops, which serves as the starting point for the cluster's activities. In the first phase, i.e. the development phase during 2021, the actors will be committed to pursuing the cluster's vision. A clearer and more detailed roadmap will be drawn up with the cluster's operators, which will enable the objectives to be achieved and whose implementation will start together. During the first two years, the activities will focus on identifying challenges and finding and implementing solution models. The aim is to carry out rapid experiments and concrete measures from the beginning of the activities. The challenges are based on the challenges already identified in the workshops, but new challenges are also identified as the national and global markets and the operating environment develop.

In the stabilisation phase of the cluster in 2022–2025, activities are already partly established and growth can be sought for the activities. At this stage, it is usual to consider what other parties are needed to participate in the activities (e.g. from the international scene) in order to achieve the visions and solution models for all challenges. At the same time, consideration is given to the development of activities, and new challenges are constantly sought to secure growth. For example, do we have the right raw materials and technologies? Is there something in the future scenarios that should be reacted to? Is there something new in the field of research that should be focused on and invested in?

As the cluster approaches the point of reaching the original vision, the focus should be on creating a vision for the future. At this stage in 2025–2030, cooperation usually changes shape and the operating model evolves, or several new operating models are generated. Futures must be envisioned and studied in order to prevent changes in the operating environment from taking the actors by surprise. At the moment, it can be seen that plant protein products continue to grow and develop steadily, but one of the tasks of the cluster is to act as the eyes of the future, because no trend always continues as it is, but is constantly evolving and transforming.

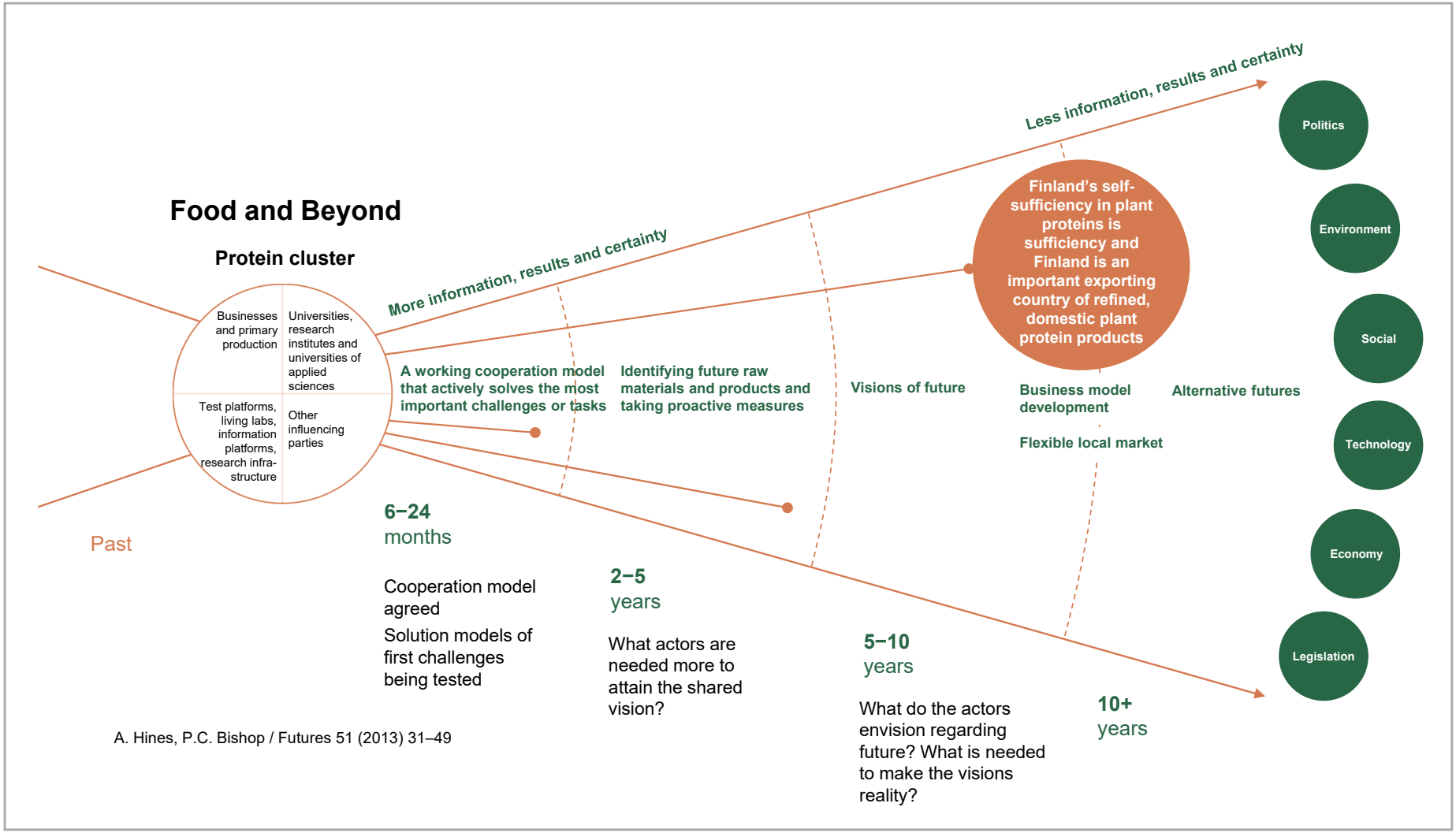

Figure 5. Protein cluster roadmap.

3.2 Proposal for an action plan for 2021

The proposed measures for 2021 are presented in Table 1. First, an agreement will be concluded between the cluster operators, establishing, for example, the scope of the activities. VTT Technical Research Centre of Finland is responsible for drafting the agreement and the negotiations between the actors. A communication plan is an important tool for achieving the objectives. The first priorities, objectives and means of communication will be agreed at a joint meeting. The communications will utilise a collaborative platform, which will be launched on the Food and Beyond website during the spring as a separate member section. The platform can be used to actively communicate about activities and allows members to discuss, share information and brainstorm ideas. The platform brings together the open challenges, resources and competences of the entire chain in the same place. This makes it easier to find partners in research, production and cultivation.

The topics of project proposals or quick experiments will be decided on at a workshop, where the identified challenges will be further developed into concrete actions. A seminar or webinar (depending on the pandemic situation) will be organised in the autumn, with the purpose of disseminating the activities and seeking new ideas through inspiring speakers and networking. Projects and experiments are started as soon as the first ideas are refined into activities. At the end of the year, an action plan for 2022 will be drawn up with the help of a co-creation workshop.

Table 1. Proposals for measures for 2021.

Action	Implementation method	When	By whom	Proposal for funding
Cluster agreement	Negotiations	Q1	VTT	VTT
Communication plan	Workshop/ meeting	Q1	VTT, MAF & VYR	Companies, MAF
Establishing and maintaining a collaborative platform	Digital solution	Q2	Food & Beyond	Membership fee for the protein cluster, VTT, MAF
Creating project concepts	Workshop	Q2	Protein cluster members	Protein cluster membership fee
Information sharing and training related to alternative proteins and novel food legislation	Workshop/ webinar	Q2	Food & Beyond	Protein cluster membership fee
Increasing impact, committing actors	Seminar/ webinar	Q3	Food & Beyond	Protein cluster membership fee
Launching projects	Project funding	Q3	Project group	Project group
Specification of measures for 2022	Workshop	Q4	Protein cluster members	Protein cluster membership fee

4 Conclusions/Summary

The aim of this project was to accelerate national cooperation for promoting plant protein value chains. The project utilised the Food and Beyond ecosystem and laid the foundation for a national protein cluster. The work was started by means of an advance survey, after which the experts participated in two workshops defining Finland's opportunities and challenges in the plant protein value chain, and in particular how and with what kind of cooperation model the identified challenges and bottlenecks could be solved.

Creating new networks, partnerships and ideas, increasing the profitability of the value chain and increasing the awareness and appeal of plant protein products, also internationally, were highlighted as the greatest opportunities in the protein cluster. Possible differences of views and lack of trust between actors, resource challenges and the possible difficult use of the platform were identified as challenges.

The identified opportunities and challenges and the vision expressions created in the project, 1) *"How could we enable profitable growing and refining domestic raw material?" 7*and 2) *"How could we grow the market for plant protein products in a positive spirit?"* guide the construction of the operating model and the creation of content for the starting protein cluster. The work was also used to build a roadmap for future cooperation.

The cluster will be established and its operations will start in 2021 with the objective of developing concrete solutions based on the vision and roadmap. The purpose of the protein cluster is to increase Finland's potential to become a significant exporting country of plant protein products. Cooperation is also an important part of achieving Finland's climate and carbon neutrality targets, as increasing the self-sufficiency in plant proteins plays a key role in this.

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