

Resilience of the Swiss food systems

Final project report, October 2020

Resilience is the capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances (Tendall et al. 2015).

Executive summary

The project (2016–2020) investigated resilience of the Swiss food system to two scenarios of disturbances: climatic (droughts), and socio-economic (free trade). To represent the Swiss food system, we chose its four essential value chains: milk, beef, wheat and potato. The resilience investigation relied on collaboration with stakeholders (workshops and interviews) and quantitative surveys among producers, processors and consumers. The results revealed coping mechanisms to both scenarios, many of which require collaboration between value chain actors. However, the results indicate deficiencies in withstanding capacity to both scenarios. In addition, identified deficiencies in adaptive capacity raise concerns regarding the ability of the food value chains to increase their resilience.

Resilience capacities

Withstand:	Adapt:	Transform:	<i>Resilience "is all about changing in order not to be changed." (Walker 2020)</i>
absorb or resist a disturbance in order to avoid losses	change to better cope with the next disturbances but retain the current structure	change structure, when current system is not able to withstand or adapt	

Focus of the project

The project focused on the capacity of the Swiss food system in its current structure to provide food for its population despite shocks. As an approximation for such capacity, we investigated current level of domestic food supply.

Switzerland is perceived as a food secure country due to the low proportion of the population under the poverty line, high food safety*, and high diet diversification (Global Food Security Index 2019). Food security is achieved both by domestic production that allows satisfying 52% food for the population (BLW 2019) and imports that cover the rest.

* Food safety refers to prevention of food-borne illnesses. Food security refers to access to adequate food (Hanning et al. 2012)

Why is provision of domestic food important for food security and resilience?

- Reduces reliance on resilience in food systems of other countries;
- Provides safety nets in case of disruptions of international trade;
- Allows maintaining agency on resilience and mode of local production;
- Allows managing transparency and imposing requirements on local value chains

Self-sufficiency is often criticized as a concept opposing trade. Nevertheless, self-sufficiency should not necessarily be regarded as a sign of self-isolationism. The aim of attaining self-sufficiency is rather "to increase domestic capacity to produce food, even if the country engages in food imports and exports" (Clapp 2015 for FAO).

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Research approach

Value chain approach

We investigated resilience of the Swiss food system through its four individual value chains (Tendall et al. 2015): milk, beef, wheat and potato. These products are part of the traditional Swiss diet, and the four value chains account for 41% of the total value of agricultural production in Switzerland (BFS 2019). The degree of self-sufficiency for milk, beef, wheat and potato value chains is 113, 86, 84 and 93% respectively (BLW 2019). The project focused on production, processing, retail and consumption activities of the four value chains.

A food value chain consists of stakeholders who are engaged in the coordinated processes of input supply, production, processing, trade and consumption.

Why is actor opinion important?
Resilience concerns the ongoing functioning of the value chains; hence, the knowledge and opinion of managers (decision-makers) regarding value chain activities, processes and interests is essential to understand and influence resilience.

Transdisciplinary approach

Since food value chains comprise different stakeholder groups with various functions and interests, investigating resilience requires an involvement of expertise from different fields and disciplines. Transdisciplinarity aims to integrate different types of knowledge and perspectives on societally relevant problems: not only scientific but also practical. Transdisciplinarity builds on participation of practitioners in the research process, which extends beyond consultations with actors to collaboration that allows both parties to influence the research process and co-determine the outcome.

Main activities of the project

• Stakeholder workshops

In 2017 and 2019, we conducted two series of stakeholder workshops on milk, beef, wheat and potato value chains. The workshop participants included input suppliers, producers, processors, retailers and consumers as well as representatives of industry organizations and associations. Based on the results of the first series of workshops, two shock scenarios were selected: **drought** and **free trade with the European Union**. The second series of workshops aimed at investigating measures to increase value chains' resilience to the selected scenarios. In 2020, at the closing workshop, we presented the final results of the project to the stakeholders and invited them to discuss implications of the results for the Swiss food system.

• Stakeholder surveys

We conducted surveys among producers, processors and consumers to obtain quantitative information on various resilience aspects. The first survey (2018) aimed at understanding anticipations of farmers and processors regarding the drought and free trade scenarios. The second survey (2019) investigated consumer attitude to support the domestic food value chains in case of both scenarios. The third survey (2019) allowed getting further insights on measures against droughts that focused on the production step of the value chains.



Kartoffelproduzenten

1.3. Kartoffelproduktion und Erträge

In diesem Abschnitt möchten wir mehr über Ihre Kartoffelproduktion erfahren:
Welche Sorten bauen Sie an und was sind Ihre Erträge.

11. Welche Art von Kartoffeln bauen Sie an? *

Speisekartoffeln
 Veredlungskartoffeln
 Saatgutkartoffeln

12. Wie hoch ist ihr normalerweise erwarteter Ertrag für Kartoffeln? (in kg/a)

	Brutto	Netto
Speisekartoffeln (kg/a)	<input type="text"/>	<input type="text"/>
Veredlungskartoffeln (kg/a)	<input type="text"/>	<input type="text"/>
Saatkartoffeln (kg/a)	<input type="text"/>	<input type="text"/>

Sources:

- Bundesamt für Landwirtschaft BLW. Agrarbericht 2019. Bern.
- Bundesamt für Statistik BFS. 2019. Interaktive Tabellen STAT-TAB. Landwirtschaftliche Gesamtrechnung (LGR) nach Bereich des Agrarsektors und Kontoposten Bundesamt für Landwirtschaft.
- Clapp, J. 2015. "Food Self Sufficiency and International Trade: A False Dichotomy?" Rome: FAO. The State of Agricultural Commodity Markets—In-Depth. Food and Agriculture Organization of the United Nations.
- Hanning, I. B., O'Bryan, C. A., Crandall, P. G. & Ricke, S. C. 2012. "Food Safety and Food Security." Nature Education Knowledge 3(10): 9.
- Tendall, D. M. et al. 2015. "Food System Resilience: Defining the Concept." Global Food Security 6: 17–23. Walker, B. 2020. Resilience: what it is and is not. Ecology and Society 25(2):11.
- Walker, B. 2020. "Resilience: What It Is and Is Not." Ecology and Society 25(2): 11.
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Drought: Producers

Summary

The majority of farmers have experienced drought. According to stakeholders, farmers have been able to deal with past droughts. However, the low adoption of measures against effects of drought questions farmers' resilience should the drought risk increase.

Effects of droughts heavily depend on farm location, timing, specific weather conditions and product.

Adoption of measures to avoid drought-induced losses requires trade-offs and competes for resources with other farm activities and considerations.

Therefore, certain drought-induced losses are inevitable and recovery measures are crucial.

Production exposure¹

Since 2010 ...

80% of farmers have experienced drought
27% have experienced drought twice
17% have experienced drought three times or more

Moderately to severely affected by the last drought:

43% Wheat producers	63% Potato producers	29% Beef and milk producers
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Effects of droughts depend on

- **Location**
Some locations are more exposed to droughts. Soils and their water retention capacity play an important role here.
- **Timing and specific weather conditions**
It is decisive when a plant experiences water deficiencies and whether drought is accompanied with heat.

- **Product**
Droughts directly affect wheat and potato production by reducing the quantity and affecting the quality of yield. Potato is more susceptible to water deficiencies than wheat. Grassland-based milk and beef production is mainly affected through production of animal feed plants and prices on animal feed.

Measures against effects of drought, their adoption rates and barriers^{1,2}

Measures	Adoption	Barriers
Drought-tolerant varieties and plants	Cattle* (37%) Wheat (24%) Potato (39%)	Unpredictable weather; importance of other criteria (e.g. pest resistance, nutritional quality of plants); insufficient drought risk; preference to store or to buy animal feed (cattle); lack of demand (dominant barrier for potato)
Stocks of animal feed	Cattle* (71%)	Not enough production to make reserves; preference to sell animals or to buy feed
Irrigation	Potato (62%)	No water source for irrigation (dominant barrier); irrigation costs (construction and operation)
Insurance against drought effects	Cattle* (1%) Wheat (13%) Potato (12%)	No knowledge of such insurance (dominant barrier); high premiums
Off-farm income	Cattle* (37%) Wheat (24%) Potato (39%)	High current workload (especially in cattle production); enough money for living from farming

* Cattle: Results of milk and beef pooled together

Sources: ¹ Producer survey (Winter 2019); ² Stakeholder workshops (Spring 2019)

Drought: Processing and Retail

Summary

The possibility to increase imports protects processors, retailers and consumers from the effects of weather disturbances on the domestic production. Consumers are well protected from supply disruptions and also trained to expect at-all-times available assortment.

Imports as a sole resilience strategy increases reliance of Swiss actors on the resilience of foreign production systems in the long run.

Another strategy could be to support the adaptation of local production if droughts become more frequent and intense.

Effects of droughts on processing and retail

- Droughts affect quality and quantity in wheat and potato production.
- For milk and beef the drought impact is more complex:



1. Droughts primarily affect grass-fed animals through lack of feed.

2. The reduction of livestock (i.e. slaughtering) leads to peaks in beef supply and a decline in milk supply.



3. This, in turn, leads to a reduction in supply of milk and beef if animal reproduction is affected.

Role of imports in the context of resili

Processing and retail cover episodic shortages in the supply of domestic agricultural products through imports.

Imports buffer the effects of supply fluctuations on processing and retail trade and allow reaching "general" resilience (not only specific to droughts).

Imports ensure that consumers always have a stable supply of foods and trains them to have a familiar assortment irrespective of weather conditions and disturbances.

Imports provide short-term relief that allows withstanding shortages of domestic supply but increases dependency of Swiss actors on foreign production systems. However, imports do not guarantee the resilience of domestic value chains if extreme climatic events become more frequent. In the long run, measures aimed at supporting resilience of local production are needed.

Possible measures for processors and retailers to increase the resilience of their value chains¹

Redistribution of financial losses along the value chain	
+	Alternative source to cover increased costs or financial losses.
-	Lack of motivation for processors and retailers when import options are available; Conflicts of interest and imbalances of market power; Difficult to recognize and allocate increased costs in the pricing system; It would distort the existing price system.

Resilience premiums	
+	Alternative source to cover increased costs or financial losses; An instrument for corporate social responsibility
-	Lack of confidence that consumers would support producers in times of drought; Unclear how consumer behavior would change in response to such measure; Lack of motivation for non-affected actors to call for consumer support and to organise consumer campaigns.

Relaxation of product quality requirements (potato)	
+	Alternative tool to assist producer recovery after a drought.
-	Possible negative consumer reaction to unexpected quality of their usual food purchase; Increase of the shelf life risks; Strict size and quality requirements for processing purposes.

Acceptance of new varieties (wheat and potato)	
+	Support for producers' adaptation.
-	Consumers have preferences for varieties that have been offered for a long time; Difficult to adapt the processing requirements.

Quellen: ¹ Stakeholder workshops (Spring 2019)

Drought: Support from consumers

Summary

There is evidence that some consumers would be willing to support farmers by paying resilience premiums in case of an adverse weather event.

Not everyone is willing to pay premiums to support farmers, therefore resilience premiums should be voluntary.

Currently, there are no mechanisms for benevolent consumers to support farmers in case of adverse weather events.

An important barrier against resilience premium campaigns is the lack of motivation from actors other than farmers to organize such campaigns. Also, there is almost no research on the possibility of consumer support.

Effects of droughts on consumers

The current system compensates decrease of domestic production supply with imports, which does not have an effect on consumer price. This insulates consumers from the rest of the value chain and makes them largely unaware about the challenges of domestic actors.

Nevertheless, consumers feel weather extremes and are exposed to information from the media about them, including coverage of adverse weather effects on local farmers.

How can consumer awareness and willingness to support farmers contribute to food system resilience?

Consumers can increase the resilience of food value chains by adapting their purchasing behavior and adjusting their expectations regarding the food they purchase.

I. Impact of consumer awareness

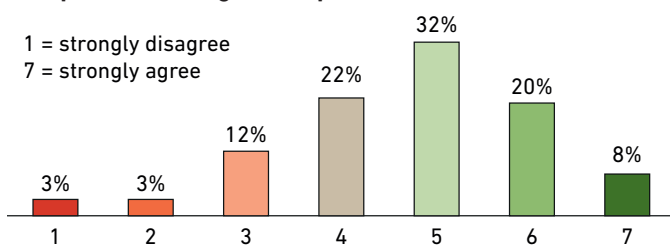
Demand for sustainability already went beyond charity and retranslated into market demand, which created new business opportunities and models. Also, consumers exert pressure on businesses to change their "business as usual".

II. Climate change is a trending topic

Resilience can become a new corporate responsibility tool for agri-food businesses given that resilience is even more closely related to climate change than sustainability. This would result in a symbiosis of social and economic benefits.

Consumer willingness to support farmers by paying more for food products during a short period of time¹

1 = strongly disagree
7 = strongly agree



Who is more likely to support farmers?¹

- Consumers who believe that domestic production is superior to foreign and who generally tend to support local producers.
- Consumers who pay attention to environmental and social sustainability when purchasing food.
- Consumers who support the direct payment system.

Factors that hamper introduction of resilience premium campaigns, according to stakeholders²

- Current evidence for consumer willingness to support is insufficient to motivate actors to run such campaigns.
- Unclear how to finance resilience campaigns and how consumers would react if a part of the premium they pay would be used for organization of such campaigns
- Lack of motivation of actors between consumers and farmers to organize such campaigns.
- Unclear when such campaigns should take place (extent of a disturbance). Consumer survey (Spring 2019); Stakeholder workshops (Spring 2019).

Sources: ¹ Consumer survey (Spring 2019); ² Stakeholder workshops (Spring 2019)

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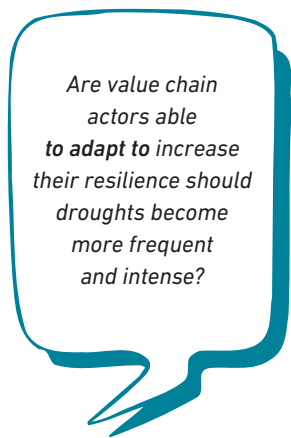
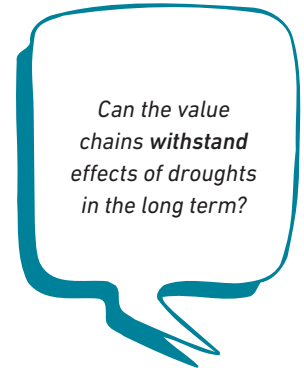
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Resilience to droughts: Summary and recommendations

According to the statements of the stakeholders involved in our project, actors in the value chain, including farmers, were able to withstand the effects of previous droughts. However, the identified lack of measures among farmers to deal with effects of drought questions withstanding capacity of the domestic value chains should droughts become more frequent or intense.

Throughout the transdisciplinary process, stakeholders stated that past droughts had not caused severe shocks for the value chains and that actors, including farmers, have so far been able to deal with droughts. However, the high non-adoption rates and non-availability of measures against effects of droughts (e.g. insurance, drought-resistant varieties, compensation through price) along with the barriers against implementation of such measures indicate that the value chains might begin lacking withstanding capacity to droughts should they become more frequent, erratic and intense.



The results reveal barriers against implementation of suggested measures aimed to increase resilience to droughts, which questions the capacity of the value chains to adapt if the risks increase.

Resilience-enhancing measures – such as stocks of feed, off-farm jobs and drought-tolerant varieties – require trade-offs, as they compete for resources (e.g. time and money) with other farm activities and considerations. Such trade-offs indicate that certain production fluctuations are inevitable and recovery measures are necessary to build resilience of production against droughts. Some of the measures that could enhance recovery require actions or change in behavior from other actors: processors and retailers. However, these actors were found to have little motivation to share the risks of producers, as they have an option to import food products in order to compensate for failures in production. Therefore, other factors that hamper adaptation are conflicts of interests and uneven exposure of actors to droughts. This represents another type of trade-off that becomes apparent on the value chain level. Another factor to hamper adaptive capacity can be a result of the opinion that the current withstanding capacity has shown to be sufficient to allow the value chains to withstand past incidences of drought.

Recommendations to increase the resilience of the value chains to droughts

These recommendations address barriers that were shown to hinder the implementation of specific measures against effects of drought (see pages 3, 4 and 5).

- Raising awareness and advising **producers** on the **risk profiles** of their farms (including drought exposure), measures against effects of droughts and trade-offs associated with such measures.
- Infrastructure and research efforts to **reduce trade-offs in the implementation of measures** against drought effects, e.g. by reducing the costs of such measures and improving their multi-criterial efficiency
- **Strategic agreement on stakeholders' expectations of a resilient and robust food system, value chains and stakeholders** for different time horizons; raising awareness of the differences between short-term and long-term resilience.
- **Inclusion and raising awareness among consumers** by the government and trade agents regarding climate resilience as well as regarding possibilities for consumer role in increasing the resilience of the domestic food system.
- Raising awareness among **stakeholders regarding their possibilities to contribute to the resilience of their value chains** and regarding the usefulness of such support; **encouraging and researching motivations** for a more integrated value chain approach to drought resilience..

Free trade with the EU: Producers

Summary

Potato producers showed the most pessimistic expectations regarding the free trade scenario.

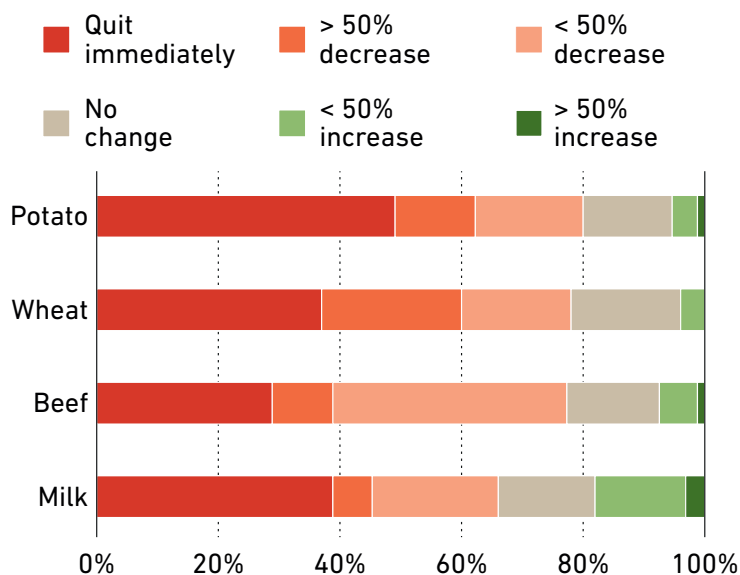
Efforts to reduce costs can intensify consumer critics and concerns regarding sustainability.

Farmers are often unable to ensure consumer loyalty to their products themselves and are therefore dependent on the success of labels and other actors of the value chain.

Marketing can impose further requirements on farmers in a situation of sinking prices.

Scenario: Free trade with the EU for all food products and agricultural inputs to be introduced in 5 years. Other supporting measures remain in place and direct payments increase by 25%.

Changes in production anticipated* by producers¹



* Does not account for farmers who anticipate starting a new production.

Strategies for producers: Their pros and cons suggested by stakeholders²

Reduction of costs	
+	Secures market share by matching up the price with foreign suppliers.
-	Difficult to match up the price; Reduction of efforts on "nonessential" farming aspects, such as animal welfare or more sustainable farming practices; Disappointment of some consumers in case of reduced sustainable performance.

Reliance on consumers: Swissness and sustainability marketing	
+	Secure market share by promoting image of localness, sustainability and Swissness.
-	Limits options for cost reduction; Direct link to consumer is advantageous to strengthen consumer loyalty but is not always possible; In case of mass products that require multiple processing steps, it is often more difficult to establish a personal link with consumers (wheat, processed potatoes); Intensive marketing can distort consumer understanding of sustainability and agriculture.

Scaling up production, mechanization	
+	Further room for cost reduction.
-	Requires investments when cost reduction is a priority; Contradicts an image among some consumers about local traditional farming.

Off-farm income	
+	Decrease of dependence on agricultural income; Protection against income loss if price drops.
-	Loss of professional farming skills; Decrease of domestic production.

Sources: ¹ Producer survey (Spring 2018); ² Stakeholder workshops (Spring 2019)

Free trade with the EU: Processing and retail

Summary

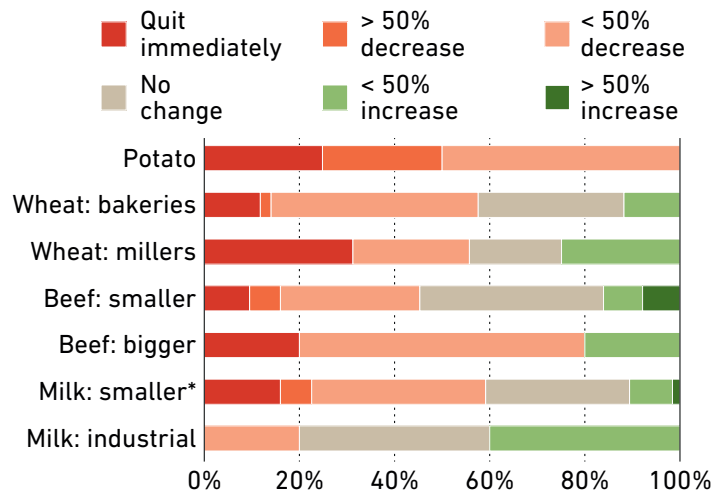
Potato processors showed the most pessimistic expectations regarding the free trade scenario. Recognizability is a large issue for side dishes and ready-to-eat products.

Some cost reduction measures could lead to the loss of "Swissness" advantage.

There are loopholes for actors to benefit from Swissness without contributing to it. Foreign actors can also use such loopholes.

Scenario: Free trade with the EU for all food products and agricultural inputs to be introduced in 5 years. Other supporting measures remain in place and direct payments increase by 25%.

Changes in processing volumes anticipated by processors¹



* Cheese is already liberalized, but its processors depend on milk producers who are not only specialized in milk.

Strategies for processors: Their pros and cons suggested by stakeholders²

Cost reduction

- Automation of processes
- Scaling up
- Use of cheaper agricultural inputs
- Outsourcing processes abroad.

+ Secures market share by matching up the price with foreign suppliers

- Difficult to match up the price;
Cost reductions require investments (which are difficult to make when there is a cost pressure);
Use of imported materials or outsourcing processes abroad could lead to loss of Swissness marketing benefit

Strategy for retailers: Stronger segmentation²

+ Splitting up the offer for Swissness-oriented and price-sensitive consumers in order to maintain the market.

- Extra pressure on actors to reduce costs; Swissness can turn into a niche market.

Reliance on consumers

+ Secures market share by promoting an image of localness, sustainability and Swissness.

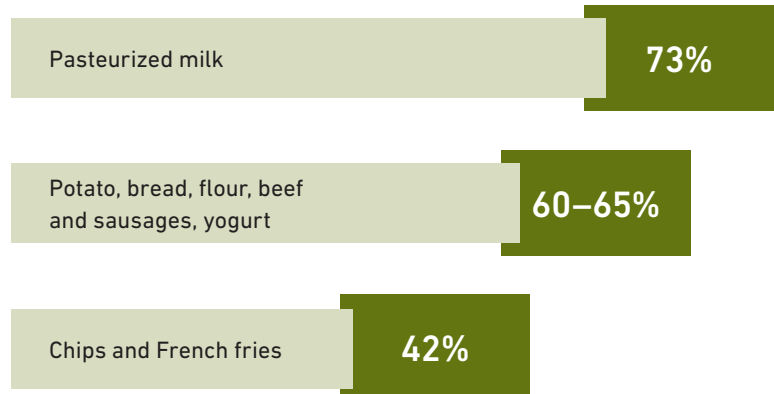
- Not all consumers are willing to pay more for Swiss products; Marketing requires extra costs and limits possibilities for cost reduction; Foreign products can be very competitive when it comes to sustainable performance;
Another Swiss-origin label would increase the number of labels and further confuse consumers (a so-called label-salad);
The demand for Swiss products would take time to form and consolidate, and it is highly possible that some players would not survive this period;
In ready-to-eat products or side dishes, origin can be obscure; Some sellers are considered local regardless of the origin of the products they sell, therefore they may have less motivation to support Swiss products; Products based on traditional recipes are considered Swiss by consumers but can be prepared without Swiss ingredients.

Sources: ¹ Processing survey (Spring 2018); ² Stakeholder workshops (Spring 2019)

Role of consumers in the EU free trade scenario

Summary
 Not all consumers would proactively choose domestic food products due to origin recognizability and varying consumer preferences. Consumer proactive choice of domestic food varies depending on the product type and consumer segment. Origin recognizability is a large issue for side dishes and ready-to-eat products, which can distort consumer support.

% of consumers reported to be willing to continue paying current prices to support the Swiss industry in case of a free trade with the EU¹



Important factors that can affect consumer support in case of free trade with the EU²

Indifference to origin and priority of other aspects

Consumers can prefer other aspects over the products' origin, for example:

- Price of products;
- Product quality (tenderness of meat, crunchiness of bread etc.);
- Preference of certain brands.

Consumer proactive choice of domestic food

Consumers are more loyal to domestic food when they:

- believe that local production has less impact on the environment due to short distances or is generally more sustainable;
- believe that by choosing local food products, they support local economy;
- trust domestic production conditions and requirements.

Recognizability of products' origin

In some cases, product origin is difficult to recognize, for example:

- Even a very supportive consumer cannot always recognize the origin of potato or bread served as a side dish or as part of a multi-ingredient dish;
- Consumers perceive some sellers as local regardless of the products' origin;
- Foods based on traditional recipes (e.g. Ticino bread, Zürcher Geschnetzeltes) are considered Swiss by consumers but can be prepared without Swiss ingredients.

Origin recognition¹:

- **Easiest to recognize** are milk and beef (more than 70% of consumers do it easily).
- For over 60% of consumers it is **difficult to recognize**, the origin of bread, French fries and croissants ingredients.

Sources: ¹ Consumer survey (Spring 2019); ² Stakeholder workshops (Spring 2019)

Resilience to free trade with the EU: Summary and recommendations

The results suggest that Swiss producers and processors lack withstanding capacity to face the effects of the free trade scenario. The results even indicate that a significant number of actors would quit their activity. This suggests that domestic value chains would require adaptation to continue functioning.

At the first interaction with stakeholders, a market liberalization was named as the potentially largest shock for the Swiss value chains. Further workshops and surveys carried out as part of the project confirmed the pessimistic expectations of most stakeholders regarding the scenario of free trade with the EU. A significant percent of actors, both farmers and processors, reported that they would not try to work under new conditions and would quit their activity even before the free trade agreement came into force. Among those who reported planning to continue their activity, many expect a decrease of their production or processing volumes. In addition to indicating deficiencies in withstanding capacity, the results can reflect disapproval of free trade agreement by actors.

*Can the value chains **withstand** against effects of a free trade with the EU?*

Are value chain actors able to adapt to increase their competitiveness against European players and secure their market position?

The results reveal a number of factors that can hamper actors' and value chains' adaptation. This questions actors' and value chains' potential to increase resilience to the effects of free trade.

Potential adaptation strategies, such as reliance on consumers and cost reduction, appear to have important limitations, which can discourage actors from attempts to adapt. Consumers are key players in the resilience of value chains to the free trade scenario, but their support is not guaranteed due to recognizability issues and varying consumer preferences. Actors would find themselves between a rock and a hard place, facing a choice to rely on consumers but risk shrinking to a niche market, or to risk losing consumer loyalty but compete with foreign products on the price level. Furthermore, disapproval of a free trade agreement can affect decision-making and hence would as well have implications on adaptation capacity.

Recommendations

- Focusing on and developing opportunities for cost reduction that would not endanger sustainable performance of the Swiss food system.
- Research of possible synergies between products with different value-added potential (also between value chains) to increase the marketing potential of mass products.
- Strengthening consumer awareness of the products' origin (raw materials and processing location): more attention for products with unclear or difficult-to-recognize origin.
- Research and development of customized and product-oriented marketing strategies that address consumers in the most efficient way (depending on the product - stronger emphasis on regionality, sustainability or Swiss origin).