



Characterisation of Case Studies – The Azores

Main actors in the case study area, concerned by the services and dysservices provided by local dairy farming

The Azores is an archipelago of nine islands with an Atlantic climate with agriculture and tourism as the main economic activities. All islands have a relatively small population with the exception of Terceira and São Miguel. The fact that agriculture and dairy farming is scattered through the different islands leads to a multiplicity of organizations such as farm associations and coops. The regional government accounts seven at the archipelago level but there are over 50 at the island level. The vast majority are local associations of very limited scope and range of activities. Some, however, play a very important role in dairy processing or technological support to local farmers. There are also five companies that play a very important role in milk collection, processing, packaging and commerce. Given the specificities of the Azorean dairy production (small farms, mobile milking wagons and milk collection at local posts), such coops and companies are extremely important.

There is only one University in the Azores (UA - *Universidade dos Açores*), created in the late 1970s, among other reasons, to curb the chronic lack of technical staff on the islands. The University has campuses on several islands. The agriculture sciences campus is located on Terceira Island and offers programs in animal science and general agriculture for instance. Despite this, many Azorean students study agriculture in continental Portugal, especially those from islands other than Terceira. There is no veterinary medicine program in the UA, however, students can study the first two years of the 5-year program on island and then complete the rest on the continent. This academic environment is a paradox as on one hand, the local university has a very limited student population and on the other hand a significant proportion of the students that go to the continent do not return to the islands for their professional life.

Azorean dairy production has an extraordinary reputation in Portugal. Consumers very well perceive Azorean dairy products and its ecological, welfare-friendly nature. There are numerous dysservices associated to the Azorean dairy production. These include aspects such as food production, food security and food traceability. They include also use of lands that otherwise would not have any other use. The fact that the Azorean dairy production is based on pastures leads also to important benefits such as territory maintenance, waste (dung) valorization and Carbon sequestration in pastures and the maintenance of biodiversity as the archipelago is home to a number of indigenous species that thrive in local meadows. Nevertheless, the most significant disservice is related to landscape shaping and territory maintenance.

Indeed, the image of the islands for tourism benefits and is connected from dairy operations and tourists actively visit rural areas just to see the hortensia (*Hydrangea macrophylla*) hedges, particularly during blooming season. Other dysservices include gastronomy and cultural heritages that are of particular importance to Azorean locals, tourists from the continent and Azorean emigrants and their descendants that frequently visit the island. Overall, dairy farming provides a very good image of the islands that is recognized by all the players in the field.

Description and key figures

- Name and NUTS (if relevant) : Azores Islands, Açores Autonomous region (*Região Autónoma dos Açores*). Islands: São Miguel, Santa Maria, Terceira, Pico, Faial, Graciosa, S. Jorge, Flores and Corvo.
- Natural environment (soil, climate, altitude): Nine volcanic islands. The majority have one central volcano (extinct). Agriculture and dairy farming is conducted at lower altitudes whereas at higher altitudes there is a predominance of forest activities. The Azores have very good quality soils due to the volcanic nature of the islands. The Azores have an atlantic climate, characterized by mild summers and winters with rainfall year evenly distributed year round. Because of soil and climate, pastures are also of good quality and available year round, which allows the regular production of milk during the whole year.
- Demography and population: density, ageing, unemployment and economic sectors (agriculture, industry, services), income & poverty. The Azores have a population of roughly 250k and an average population density of 106/km². The most populated islands are S. Miguel and Terceira where the major cities are located. The islands are characterized by the predominance of extensive agriculture using local pastures for the feeding of animals, particularly dairy cattle. With the exception of dairy production other agriculture productions such as forestry, crop, monogastric and small ruminant production is negligible.
- The Azores are classified as an ultra-periphery region of the UE with a status similar to the Madeira islands (Portugal), the Canary Islands (Spain) or the French departments in the Caribbean and the Indian Ocean. Is one of the lowest income and poorest regions in Portugal (20.100€/capita year). Agriculture is a very important component of the regional economy, particularly dairy farming.
- Area: The Azores have a total area of 120k ha. Of these, 3% are agricultural area comprising essentially permanent pastures and meadows, used chiefly for animal and milk production
- Livestock units: Regarding animal production, the Azores is one of the most important cattle production region in Portugal. It has an inventory of 248k cattle, of which 93k are dairy cows.
- (additional parts to the diagnosis for WP4.1 Dairy sector economic analysis. If the area chosen for WP4.2 is smaller than for WP4.1, please give some information about the dairy sector)

Main economic issues in the territory

The Azores has several economic issues. The major problem to local populations is the relatively small size of the local market and its location. Additionally, the nature of the land and of the islands makes it unsuitable for agriculture production other than dairy production. Nevertheless, its important location in the middle of the Atlantic, half way between Europe and the Americas renders the archipelago a very important strategic location. Since the incept of its colonization, 500 years ago, the Azores have experienced several economic activities that included traditional agriculture and fishing of course but also ship supply and whaling, among other activities. These have remained more or less stable over the centuries. Since World War II, the Terceira Island has hosted a U.S. Airforce base that renders also important economic benefits. Since the 1980s, tourism, particularly nature-based tourism (e.g. whale watching, nature hikes, scuba diving, radical sports, etc.) have gained economic importance. Industry is very scarce and essentially located on the larger islands. Today, the majority of agriculture is geared towards dairy production. The milk however is seldom transformed in the Azores, being mostly packed in UHT carts and shipped to continental Portugal or other regions of the EU at very high transport costs, hindering the competitiveness of Azorean dairy production. Traditional activities such as fisheries have been losing importance in the economy of the region. It is interesting to notice that some decaying areas such as whaling that was banned in the 1980s experienced quite a comeback with the conversion of the former whalers into guides and lookouts for whale watching activities, one of the tourism trademarks of the Azores.

Within such a framework, the major economic issues are related to a generalized lack of diversity in the economy where three areas predominate: Agriculture, Tourism and Services. It must be emphasized that the latter comprises essentially work in the public sector particularly the regional government and municipalities. In both agriculture and tourism, there is a predominance of low pay jobs which in leads in turn to a generalized low income. It is must finally be noted that the majority of the people employed in agriculture farm their own land or the land of a close relative. The fact that the farms are very small and atomized also contributes to a very low income in the agricultural sector. Finally, the fact that only small amounts of milk are transformed in the Azores leads to a generalized lack of added value in this production with shrinking benefits over the last decades.

Main social issues in the territory

The Azores are one of the most challenging regions in Portugal when it comes to social issues. Indeed, the low-income status of its population, particularly by comparison to the Portuguese and EU averages, has led to several social problems. The most severe is the generalized availability of low-pay /low skilled jobs in which the majority of the population is employed. Furthermore, the mechanization of agriculture and dairy farming and the demise of traditional activities such as fishing has led to a generalized lack of jobs, which in turns leads to unemployment and rural exodus into cities and into continental Portugal which leads to population decrease on the islands, albeit the fact that Azorean families tend to have numerous offspring. Such problems have been a part of the social context of the Azores for many centuries. Traditionally, the Azorean people emigrated in massive numbers. During the 19th and early 20th century, such emigration was directed mostly to the United States of America, particularly New England, but also Australia. In recent years, Azorean emigration has diversified its destinations and include also cities in continental Portugal, in addition to EU countries.

The lack of opportunities, and scarcity of high-skilled jobs, in combination with a generalized access to higher education has furthermore led to an exodus of citizens with high skills that frequently study in the continent but frequently do not return to the islands upon graduation.

Other social issues in the territory are related to the remoteness of some of the smaller islands that render life very difficult and challenging for most of the islanders, particularly by comparison to Azoreans that live on S. Miguel or Terceira. Indeed, many of such islands experience a local lack of state infrastructures such as hospitals or health centers as well as other public services. The situation is particularly dire as the communications between the islands is feeble with large distances that have to be covered by boat or airplane. In the event of storms such as those that hit frequently the North Atlantic, it is impossible to leave, reach or transport supplies to some of the smaller islands.

Main environmental issues in the territory

The Azores do not have real significant environmental issues. Indeed, such a low population and lack of industries and mining operations leads to very limited solid pollution and effluents from urban population.

Conversely, the pollution derived from agriculture is a growing concern. Being chiefly a dairy region, the majority of such pollution is derived from effluents produced by cows. Nevertheless, the problem is mitigated by the nature of the production system that is pasture-based. Indeed, and as the animals are not stalled, the majority of the effluents are dispersed naturally through the different plots of land and pastures without significant effluent production. The recycling of such effluents as pasture fertilizers furthermore contributes to the sustainability of the system.

The problem is however more exacerbated in areas where production has been intensified in recent years, particularly on the islands of Terceira and S. Miguel, where several large-scale dairy operations have been established in the recent years. In such conditions, animals are kept in stalls in large numbers and there is a tendency for a large production of effluents.

Another important issue can be overgrazing. Indeed, and given the small agricultural property nature of the Azores, it is frequent to find a higher numbers of cows per ha than it would be desired as farmers hope to increase the amount of milk produced, generating more milk and subsidies. This creates in turn problems of overgrazing and depletion of pastures, as well as erosion to which volcanic soils are particularly susceptible and may in turn increase the production of effluents.

Main agricultural issues in the territory

The Azores face several agricultural issues. These will increase in years to come, likely posing major issues for local (dairy) farmers.

The major issue is related to climate changes. Indeed, in recent years a tendency to diminishing rainfall and the occurrence of periodic droughts have been registered. This is particularly problematic for the dairy farming that is based on natural pastures. Indeed, the rainfall decrease leads in turn to a lack of pasture and the necessity of supplementing animals during certain parts of the year. This has costs in concentrate imports and also in the production of fodders, overall contributing to production costs increase.

A second and very important issue is related to the low prices paid by the industry to the dairy farmers. Indeed, the fact that the industry is concentrated on 5-6 major players leads inevitably to low prices paid and very high transport costs within the same islands and frequently from island to island. The production however is still profitable due to the low input nature of the farming system and the generous EU and national subsidies, as well as some particular quality prizes such as the *vacas felizes* (happy cow) program.

A third issue is related to the remoteness of the islands. Indeed, they are located far away from major cities and consumer markets. This leads to very high transport costs, which in turn curb the overall profitability of milk production in the Azores, as well as the economic footprint.

A fourth and last agricultural issue is a low consumer perception of animal production, both from an animal welfare and sustainability point of view. The problem is essentially directed at intensive pig, poultry and dairy production, particularly on the continent. So far, the Azorean dairy production has suffered little from these problems. However, they may in turn lead to a decrease in milk and beef production in Portuguese urban markets that are the main consumers of the Azorean dairy industry.

Main dairy farming systems in the territory

Dairy farming is the key agricultural activity in the archipelago. Farms are very small and dispersed. Typically, they have low inventories (10-15 dairy cows). Farms have few infrastructures that in most cases is limited to mobile milking parlors and fencing in the form of hedges. Feeding is based on natural pastures on the rich volcanic soils with minimal supplementation. Productions per cow are low, compared to other dairy regions of the EU. Most farms are very remote and the bulk of the milking is done using portable machines that are moved around the different and scattered plots of land within one farm. Machines are frequently limited to a mobile milking parlor and a tractor or pick-up van.

Such farming systems has some advantages. The most important is the low need for amortization costs and the little need for machinery investments. Additionally, it has low veterinary costs and the cows have a longer productive life which leads to low culling rates and costs. Overall, it leads to a better public perception of dairy farming, particularly from an animal welfare and sustainability perspectives, which in turn leads to an added value of local dairy products that frequently fetch higher prices in the domestic market. This is particularly noticeable in bottled milk with a quality and environmental friendly seal such as the happy cow program, or with PDO dairy products such as the *Queijo da Ilha* cheese, the only Portuguese PDO bovine dairy product.

New challenges for dairy sector sustainability in the Azores

Date of the Workshop: 11 April 2019

Type of participants	Number of participants
Farmers	2
Technicians/technical support	1
Agrifood industry	1
Municipalities/local communities and administrations	2
Parks/natural official office	1
Universities/agricultural highschools	1
Employment services	1
Human nutrition	1
TOTAL	10

Analysis

STRENGTHS	WEAKNESSES
<p><u>Economic</u></p> <ul style="list-style-type: none"> - Brand Azores - Product that matches expectation <p><u>Social</u></p> <ul style="list-style-type: none"> - Social relevance of dairy production <p><u>Environmental</u></p> <ul style="list-style-type: none"> - Climate - Landscape and its image - Environmental Quality - Sanitary barrier <p><u>Agricultural</u></p> <ul style="list-style-type: none"> - Pastures - No need of irrigation - Binding conditions - Excellence in Animal Health and Milk Quality - Optimized use of endogenous resources 	<p><u>Economic</u></p> <ul style="list-style-type: none"> - No synergy between production - Lack of support in processing and marketing - Logistics - Dimension and price - lack of competitiveness - Distance to consumption markets - Poor valuation of resources and investments - Lack of differentiated products; copying models that are not suitable <p><u>Social</u></p> <ul style="list-style-type: none"> - Non-existence of a common model between production and transformation - Human resources and training <p><u>Agricultural</u></p> <ul style="list-style-type: none"> - Lack of innovation and inadequate machinery - Feeding not 100% pasture - Non-differentiated milk with different nutritional quality
OPPORTUNITIES	THREATS
<p><u>Economic</u></p> <ul style="list-style-type: none"> - Evolution of the dairy production - Accumulated industry knowledge - Niche markets <p><u>Social</u></p> <ul style="list-style-type: none"> - Tourism and sustainable production <p><u>Environmental</u></p> <ul style="list-style-type: none"> - Close to nature - Image associated with the environment <p><u>Agricultural</u></p> <ul style="list-style-type: none"> - New products - Regional union model - Meat and its association - Market to explore in innovation 	<p><u>Economic</u></p> <ul style="list-style-type: none"> - Instability of global markets - Free movement in markets - Large salers (supermarkets) - imbalance - Single production model / concerted strategy - Brand Azores with poor commercial quality - Competition between farms with a larger size - Delay in attracting markets <p><u>Social</u></p> <ul style="list-style-type: none"> - New Diets (vegan, vegetarian) <p><u>Environmental</u></p> <ul style="list-style-type: none"> - Quality of water resources - Territory management - Decrease of biodiversity - Waste production / effluent concentration - Invasive species <p><u>Agricultural</u></p> <ul style="list-style-type: none"> - Intensive production

List of issues ranked by importance (percentage of the attendants who voted the issue)

1. 90% pasture + 5% grass silage
2. Risk of low silage production as in 2018 with direct impact on milk production
3. Production of maize silage has risen
4. 6-10 kg of concentrate per animal, a figure that has remained stagnant
5. Lower consumption of mineral fertilizers in pasture with greater use of slurry
6. Significant improvement in the genetics of the animals with the highest calorie consumption per animal, but the pasture does not cover all the energy requirements

Main trends in dairy production:

- rotation of animals with a mobile milking;
- Increase of milk production due to increase of dairy cows stabulation,
- higher herds with higher productivity;
- less energy consumption
- lower consumption of fertilizers
- Improvement of crops quality with government support

Main issues related to dairy production:

1-Economic

- Logistics
- cost of acquisition of more agricultural area
- maintenance cost / distance
- poor valuation of final product

2-Social

- Lack of Human Resources and poor qualification
- Urban pressure/proximity of touristic areas

3-Environmental

- Low stabulation area
- EU regulation

4- Agricultural

- Division of soils parcels
- Size of soil parcels
- production factors

Services and dysservices and indicators used to measure them

Category	Description	Indicators
Milk and dairy products production	The milk produced in Azores can be called as "pasture milk" since it is mainly produced in pasture and has some specific characteristics. It might be possible to distinguish this milk from milk produced in stabulated systems. Similarly, the butter produced with pasture milk is also different. More than the quantity of product, the quality and taste of the product is of relevance	Kg of milk, butter and cheese produced. Satisfaction of consumers
Meat production	As for the milk, the quality of the meat produced in Azores is different from other Portuguese regions	Kg of meat produced
Manure production	Solid manure was in the past the main source of nutrients. More recently, the intensification of the system lead to the production of high amounts of slurry that are used as substitute of mineral fertilizers.	Amount of slurry applied to soil
Countryside/landscape	The main touristic image of Azores is the pasture with dairy cows.	Area of permanent/temporary pasture
Control of weed and infestant	If the dairy production stopped, large areas will be abandoned and native vegetation will come back	Cultivated area
Biodiversity	Dairy farmers tend to use local species in pasture and contribute to maintain some local species	Number of local species used in pasture
Soil health and quality protection	Dairy farmers tend to adopt new strategies of fertilization and decrease amounts of pesticides used	Amounts of mineral fertilizers and pesticides
Milk network	Milk production create a network of services that will not continue if dairy production stops	Number of dairy farms or number of dairy cows
Territory management and organization	All the island organization in terms of roads and small paths and tracks is based on dairy production, namely access to pasture	Number of paths and tracks maintained by dairy farmers
Tourism - attractions	Dairy farms and pasture are today a tourist attraction for Azores visitors	Number of tourists interested in Dairy production Number of farms visitors
Tourism - accommodation's	Some dairy farms have now some rooms to rent	Number of rooms
Employment	Dairy is one of the main activities in Azores and ensure a large number of employees	Number of dairy employees
Complement of income	Many dairy farmers have a principal activity in other services and use dairy as a complementary income	Number of dairy farmers working in other sectors
Partnership in field work	Several activities as silage preparation, maize and grass sowing, animal's management were generally performed with support of farmers from the neighborhood. Such service is disappearing.	Number of days work by each farmers helping other farmers.
Regional language (measurement units, specific terms of dairy)	Dairy farmers from Azores used some specific words related with animal management or forage production	Number of specific terms/words

List of Innovative practices likely to improve sustainability and competitiveness of dairy farming

Innovative practices	Factors that prevent the adoption
1- Better soil management, namely soil analysis and adequate fertilization	Low number of Laboratories and technicians for soil collection. The time between soil collection and results communication
2- Permanent pastures	Increased maize production for silage
3- Direct sowing	Lack of equipment and knowledge
4- Synergies between producers	individualism
5- Assessment of the quantity and quality of milk produced in each farm to allow the certification of the milk industry	Lack of technicians and laboratories
6- Production, industry and distribution: linking all partners to get a more targeted production	Lack of Political and regional power
7- Encourage self-transformation	High investment and legislation
8- Use of slurries	Lack of equipment for slurry application and knowledge about fertilizing value
9- Improvements of animal welfare and control of reproduction	
10- Classification of the milk quality based on the holding characteristics	