



GRAZING DAIRY COWS
A MODEL OF SUSTAINABLE AGRICULTURE

IDEASS AZORES, PORTUGAL

Innovation for Development and South-South Cooperation



Presentation

by Fátima Amorim, Maria Manuela Alves, Pedro Manaças, Paulo Miranda

The historian Gaspar Frutuoso, in his writings “Saudades da Terra”, written between 1586 and 1590, described Terceira, an island in the archipelago of the Azores, as: “An island with a infinite amount of cattle and sheep, a great number of domestic and wild pigs, and many goats, so that there is a great abundance of milk, butter, cream, cheese, cottage cheese and delicious cheese cakes.”

Four hundred years later, these words still ring true for anybody visiting the islands. This is a sure sign that the type of agriculture practised in the Azores, a region with a particularly fragile ecology, is compatible with the environment and animal welfare. This kind of agriculture can guarantee

agricultural products at competitive prices, brings economic benefits to farmers and the local population, creates good prospects for rural families and also fosters the development of other important economic sectors, such as tourism and the service industry.

This type of dairy cattle farming model, which in industrialised countries is confined to marginal areas, though lately its distinctive qualities have been the subject of increasing interest, is typical of the Azores, the westernmost part of Europe.

The model used in the Azores has specific characteristics: dairy cattle graze all year round; there are few barns or farm buildings to stock



food, since the cows are always out at pasture; natural grazing is complemented by fodder and concentrate, the latter used to supplement pasture in times of bad weather or administered at the discretion of the breeder. Grazing is carried out on a rotation basis, which guarantees correct pasture management, limiting trampling and preventing the destruction of the vegetation layer. Fields are traditionally separated by stone walls, which also offer protection from winds and prevent the flowing of surface water. However, it was the introduction of electric fencing that led to a more functional management of grazing animals. This system of semi-intensive farming has produced significant results also terms of animal health.

Milking is carried out directly in the meadows thanks to the use of mobile milking machines, an innovation of the Azores. Pastureland can feed 2-2.5 cows/hectare, and good pastureland provides enough food for three cows per hectare; average production varies between 15 and 25 litres of milk per day, and costs are lower than in the rest of the European Community.

The Azores represent only 2.5% of the Portuguese territory but they provide almost 30% of Portugal’s total milk production.

This system of grazing cattle management is, in every respect, an advanced production model that can provide an excellent product at highly competitive prices. Since it is easy to set up and replicate, and requires little economic investment, this cattle grazing model can be easily applied, completely or in part, in any country that has dairy cattle.



The problem it solves

Among the animal or vegetable products which man uses for food, milk is the most important and natural, and can provide all the nutrients needed for development.

Man has substituted human milk with that of many different animals, such as horses, donkeys, goats or camels. But it is cows milk which is produced and consumed in the greatest quantity, both because of its organoleptic qualities, which makes it very similar to human milk, and because it is easy and cheap to produce.

The fact that cows milk is of extreme importance for man means that production techniques and methodologies are of considerable interest.

Basically, milk production is carried out in three ways:

- intensively
- semi-intensively
- extensively

In Western countries, many of which have a climate that is especially suited to milk production, intensive farming models prevail. This model has removed the risk of milk shortages, but it has produced problems which did not exist before.

Intensive farming

Intensive farming, which is typical of low-lying industrial countries, generally involves:

- Keeping animals in barns and milking them in parlours;





This problem can also be seen from a different angle: intensive production affects the surrounding agricultural environment. Success requires massive mobilisation of resources to meet the requirements of fertilisation, irrigation, food storage and collection and treatment of effluents.

- Infrastructure for storing fodder (crops are available for just a few months of the year), which is then fed to the animals for long periods of the year;
- Massive use of flour from cereals, oleaginous seeds and industrial by-products, accompanied by supplements such as bicarbonate of soda to prevent abnormal ruminative fermentation

This technology has led to an increase in milk production from the traditional 5-15 litres to 30-40 litres a day.

It is a model which requires a great deal of financial resources, capital investment, and technical know-how, and has led to excessive milk production, forcing the European Union to implement a quota regime.

The system has some intrinsically negative aspects. It has led to:

- a big drop in the number of producers and a rise in the number of heads per farm;
- reduced average production life of cows, and a fall in births from 5-6 to 2-3 calves;
- environmental pollution caused by intensive production of fodder to feed the cows and difficulties in collecting and treating effluent;
- milk and dairy products lacking organoleptic qualities and increasingly causing food intolerance.

The system consumes a lot of energy and ceases to be functional when energy input is greater than production output, as recently happened with the increase in oil prices, which affects many aspects of intensive farming.

Extensive farming

Extensive farming is typically used in meat producing countries, where cattle graze over large areas of land and the animals are only herded when they are taken to the slaughterhouse.

Semi-intensive farming

The semi-intensive model used in the Azores has specific characteristics: dairy cattle graze all year round; there are few barns or farm buildings to stock food, since the cows are always out at pasture; natural grazing is complemented by fodder and concentrate, the latter used as supplements in times of bad weather or administered at the discretion of the breeder.



This model of dairy cattle farming has developed from the environmental characteristics of the Azores. The archipelago of the Azores is located in the centre-north of the Atlantic Ocean, about 1500 kilometres from the Portuguese mainland. It is made up of nine islands of volcanic origin: it has a temperate wet climate, an average temperature of 16.9°, an average rainfall of over 1000 mm, spread evenly throughout the year, and an average relative humidity of 80%. The archipelago, which has an area of 2332 km², constitutes 2.5% of the total area of Portugal, but with nearly 93.831 dairy cows bred in 4672 mostly family-run farms averaging 8.8 hectares in size, it provides nearly 30% of the country's milk production.

The agricultural sector, more than the service, fishing or tourism industries, has seen development over the last few years, due mostly to the environmental and conservationist concerns of the region.

Agriculture, namely dairy farming, has been the main driving force for socio-economic development in the Azores. Proof of this is the significant number of young people that have taken up agricultural activities over the past few years.



Grazing dairy cattle in practice

Grazing dairy cattle farming in the Azores preserves the environment and supplies consumers with healthy, high quality organoleptic products. It is profitable for producers, guarantees good prices for consumers, motivates the young generation to continue farming and contributes to a balanced development of other sectors.

In the Azores Autonomous Region, vocational training is a fundamental instrument used to help young farmers set up agricultural enterprises.

The Azores account for 2.5% of the Portuguese territory, but in terms of production they provide about 30% of Portugal's total milk production.

In the last few years producers in the Azores have bought milk production quotas (the European Union has a production quota regime) from farmers on mainland Portugal. So despite the cost of shipping local products to Lisbon and other cities in Portugal, the milk production method in the Azores continues to be competitive in a saturated market such as Europe's.



The milk production system has the following characteristics:

Technical aspects	Influence on costs
1. Absence of farm buildings	Reduced amortisation costs
2. Absence of fodder storage buildings	Idem
3. Absence of milking parlours	Idem
4. Extended average lifespan of cows	Idem + reduced vet bills
5. Low rate of animal substitution	Idem + more animals for sale
6. Reduced number of effluent collection facilities	Idem + environmental benefits



Economies of scale

There are also other economies of scale:

- Rotation or perennial pasture means reduced costs because there is little need for tillage, sowing, fertilising, harvesting and food storage;
- In a favourable climate, with a good rainfall, spread throughout the year, as in the Azores, there is little need for irrigation or fertilisation, since nutrients present in cow dung helps to fertilise the soil.



Sustainable territorial management

The islands of the Azores, which are all of volcanic origin, are characterised by steep hills and friable land. The presence of stone walls on the grazing land, the fact that the soil is rarely ploughed, and careful crop rotation all help prevent the flowing of surface water and consequent land slips.

The same intensive management system also preserves environmental quality: the land is not overexploited and there is little need to use fertilisers, since cow dung meets most fertilisation needs; this prevents soil salinization, a phenomenon which is frequent in intensive pasture areas. Careful pasture management also guarantees weed control, so that there is little need for herbicides. This means that there is no danger of polluting water layers, a very serious problem in areas that make excessive use of Atrazine.

Animal health

Non-intensive milk production leads to improved animal health. Cows that produce 15-20 litres of milk a day are far less prone to the so-called technopathologies of industrially farmed animals: mastitis, foot disease, changes in ovulation cycles, metabolic disorders, all problems which require constant veterinary attention and massive use of pharmaceutical products.

The results produced by semi-intensive management go beyond reduced farming costs: they can be seen in improved animal health and an increase in the average lifespan of cows from 5-6 years to 10-12 years.



Milk quality and public health

The fact that this production process does not involve chemical products means that there is little difficulty in obtaining a “biological” certificate. Carefully washing of all milking equipment and rapid refrigeration is all that is needed to obtain a final product with microbiological parameters that give it the status of “high-quality milk”.

The produce of this type of semi-intensive management, in contrast to industrially produced milk, has the typical organoleptic qualities that give it a taste and smell that denotes quality, and makes it particularly safe for consumption by children, the sick and elderly.

It is, in every respect, a very advanced dairy cattle management system that can offer competitively priced, high quality produce. Because it is easy to set up and replicate, and requires little economic investment, this type of pasture management can be easily applied, completely or in part, in any country where there is dairy cattle.



Soft technology

The model used in the Azores makes use of what is known as soft technology:

- Electric wire to fence off pasture areas;
- Fodder rolled in plastic bags which are kept on the pastureland;
- Mobile milking machines.

Mobile milking machines

The **mobile** milking machines are the most interesting innovation in the management of dairy cattle in the Azores: from the simplest of machines, with two milking points, to the most complex with 10 or 12 milking points; they were introduced more than 30 years ago.



A **mobile** milking machine consists of a chassis and two wheels, with a system to hook it onto a tractor or any other traction vehicle; it can even be pulled by horses. A motor on top of the chassis produces a vacuum, and there are tubes and everything else that can be found in a milking parlour.

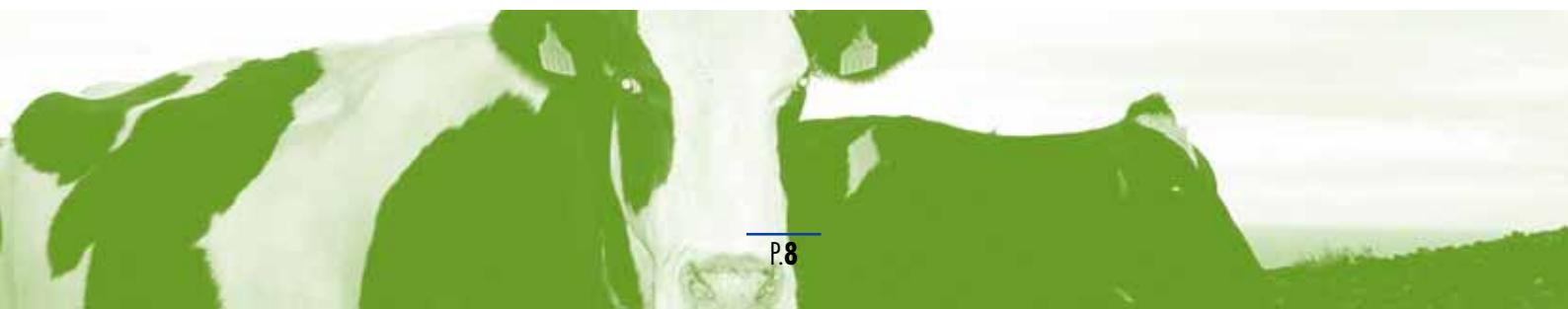
One side is made up of various racks with troughs where the heads of the cows are locked into place, so that they can be fed silage or small quantities of concentrate while they are being milked.

The milk is pumped into a wheeled tank, or a tank located on another vehicle. These tanks can be refrigerated, which helps to improve the microbiological quality of the milk.

Mobile milking machine mean that cows can be milked directly on the pastureland, which greatly facilitates operations for farms whose land is divided into lots located in different areas.



Built in the Azores by assembling various components, they are very efficient and practical to use; they are also cheap to build, and represent the backbone of this production model.



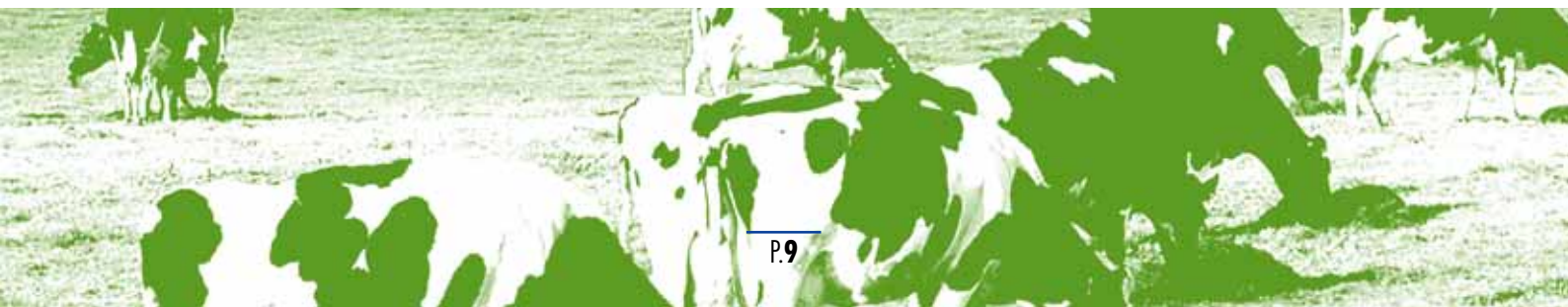
Results

The most significant result of this management model has been constant development of livestock farming over the last 30-40 years.

Both in an island like S. Miguel (the biggest in the Azores group), S. Jorge, or Terceira, milk producers (grouped into various cooperatives and associations, providing technical advice and other services), represent the mainstay of the regional economy, acting as a driving force for other economic sectors such as the service or tourist industry.

The archipelago exports cheese, UHT milk, powdered milk and butter to the continent. Of particular note is an Azorean dairy product called Queijo de S. Jorge (one of the five islands from the central group of the archipelago), a traditional cheese made with untreated milk, which because of its special qualities and economic importance, received the Protected Designation of Origin appellation (PDO). This cheese, apart from being exported to Europe, also has another great market outlet in the United States and Canada, where there is a large community of Azoreans.

It is important to underline the considerable advantages that this model brings to the quality of life of farmers in the Azores. A breeder with 50 heads of milk cattle normally has an eight-point mobile milking machine on his farm, which can perform the two daily milking operations (one in the morning and one in the evening) in just 2-3 hours a day. It is a relatively short time if compared to the time spent by breeders in milking parlours, which requires much greater investment to set up compared to the purchase of mobile equipment.



International interest

Although the Azores enjoy particularly favourable weather conditions (temperate climate, mean average temperature that remains fairly constant through the winter and summer, and rainfall that is spread evenly throughout the year), there are many countries that might be interested in applying this agricultural model, either in its entirety or in part.

The grazing dairy cattle management model is typically used in New Zealand (an industrialised country with the lowest milk prices), and is traditionally used in other countries with a continental climate.

In countries with a Mediterranean climate, transhumance used to be common: cows grazed for most of the year in low-lying pastures to be taken in the summer to pastures at high altitudes where grass could still be found. In the autumn, when the grass once again began to grow in low-lying areas, the animals were driven back.

This type of management, in which pasture provides dairy cattle with most of their food requirements, is once again arousing interest in many breeders, since it provides the prospect of reduced costs and better quality products, factors which are closely connected to the model used in the Azores.

In many countries that lack the economic conditions for intensive agriculture and where the dominant model is still grazing, interest could focus on other aspects of the Azores model, such as the use of electric wire fences and mobile milking machines.

In consideration of the clear advantages offered by the Azores model, many international organisations might be interested in implementing it in other countries.





Adopting the grazing dairy cows in other countries

The production of milk from grazing cattle and mobile milking machines is not subject to any legislative restrictions.

However, the following are of prime importance:

- Soil and climate;
- Cultural conditions;
- Social conditions;
- Political conditions

In terms of climate and terrain, the average annual temperature, the amount and frequency of rainfall, and soil fertility must be taken into account;

In terms of culture, knowledge of production techniques, interest in learning new technology, education and participation in agricultural training courses must be taken into account;



Important social concerns include the existence of producers, efficient technical and veterinary assistance networks and easy accessible markets to sell products;

Political concerns regard the willingness of national, regional, and local institutions to invest in the development of the dairy sector, guaranteeing easy access to investment aid, providing vocational training and technical assistance.

The following Associations and institutions might be interested in this project:

- producer associations;
- professional associations;
- consumer associations;
- local and regional technical assistance institutions;
- international institutions involved in local development;
- universities.



Further information

- University of Florida: Pasture forage for Dairy Cattle
- University of Wisconsin – Madison: Center for Integrated Agriculture System
- Pennsylvania State University: Dairy Cattle Nutrition
- University of Kentucky – College of Agriculture: Pasture for Dairy Cattle, Challenges and Opportunities
- USDA United States Department of Agriculture: A Grazing Strategy for Small Dairy Farms
- University Massey New Zealand: Grazing Ecophysiology and Grazing Ecology
- Tropical Dairy Farming: Feeding managements for Smaller Holder Dairy Farmers in the Humid Tropics
- Ontario Ministère d’Agriculture, de l’Alimentation et des Affaires rurales: Tirer profit du pâturage
- Rural infos. Org: Plus D’erbe et moins du lait = des Jeunes installè
- <http://www.dca.uac.pt/intro.php>
- www.azores.gov.pt

Who to contact



The following institutions in the Autonomous Region of the Azores can provide support and technical assistance to interested parties in implementing the innovative grazing model in their own countries.



REGIONAL AGRICULTURAL AND FORESTRY SECRETARIAT

Regional Directorate of Community Agricultural Affairs

Fátima Amorim, Regional Director

Telephone: 295 403 630

Email: info.draca@azores.gov.pt

REGIONAL DIRECTORATE OF EUROPEAN AFFAIRS AND EXTERNAL COOPERATION

Rodrigo Oliveira, Regional Director

Telephone: 296 30 11 00

Email: draece@azores.gov.pt

UNIVERSITY OF THE AZORES

DEPARTMENT OF AGRICULTURAL SCIENCE

Alfredo Borba, Director of the Department of Agricultural Science

Telephone: (+351) 295 402 200

Fax (+351) 295 402 205

<http://www.dca.uac.pt/intro.php>

Email: ddca@notes.angra.uac.pt

borba@notes.angra.uac.pt

<http://www.uac.pt/~borba>

S. MIGUEL AGRICULTURAL ASSOCIATION

Jorge Rita, Chairman

Telephone: 296 490 000

Email: aasm.cua@mail.telepac.pt

S. MIGUEL ASSOCIATION OF YOUNG AGRICULTURISTS

Vergílio Oliveira, Chairman

Telephone: 296 682 363

Email: ajam_cja@hotmail.com

The IDEASS Programme – Innovation for Development and South-South Cooperation – is part of the international cooperation Initiative ART. IDEASS grew out of the major world summits in the 1990s and the Millennium General Assembly and it gives priority to cooperation between protagonists in the South, with the support of the industrialised countries.

The aim of IDEASS is to strengthen the effectiveness of local development processes through the increased use of innovations for human development. By means of south-south cooperation projects, it acts as a catalyst for the spread of social, economic and technological innovations that favour economic and social development at the local level. The innovations promoted may be products, technologies, or social, economic or cultural practices. For more information about the IDEASS Programme, please consult the website: www.ideassonline.org.

IDEASS

Innovation for Development and South-South Cooperation



ART - Support for territorial and thematic networks of co-operation for human development - is an international co-operation initiative that brings together programmes and activities of several United Nations Agencies. ART promotes a new type of multilateralism in which the United Nations system works with governments to promote the active participation of local communities and social actors from the South and the North. ART shares the objectives of the Millennium Development Goals.

In the interested countries, ART promotes and supports national co-operation framework programmes for Governance and Local Development - ART GOLD. These Programs create an organized institutional context that allows the various national and international actors to contribute to a country's human development in co-ordinated and complementary ways. Participants include donor countries, United Nations agencies, regional governments, city and local governments, associations, universities, private sector organizations and non-governmental organizations.

It is in the framework of ART GOLD Programmes where IDEASS innovations are promoted and where cooperation projects are implemented for their transfer, whenever required by local actors.