The sustainable use of biodiversity in Med area: The contribution of the QUBIC project

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THE SUSTAINABLE USE OF BIODIVERSITY IN MED AREA: THE CONTRIBUTION OF THE QUBIC PROJECT

Edited by Giuseppe Spartà, Carlo Diaferia, Maurizio Bonanzinga, Jorge Molina, Notis Argiriou, François Casabianca, Françoise Robert

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Preface

The QUBIC project - *Animal Breeding: Quality, Biodiversity, Innovation and Competitiveness* – to which the Sicily Region has participated as Lead Partner and funded under the territorial cooperation programme MED, is an example of good practice for the implementation of transnational cooperation strategies useful for the development of territories.

I think that QUBIC is a project of strategical as well as tactical importance, since cooperation, whether at national or at regional level, constitutes a way to get new and updated information, to encourage innovation, to gain useful knowledge.

Cooperating to achieve a common objective means taking into account more points of view than those already known, exchanging ideas, know-how, experiences that can create added value in terms of good governance.

Placing side by side a transnational cooperation strategy and a regional strategy allowed us to obtain multiple benefits in terms of better understanding of the various territorial contexts, better results and exchange of experiences, higher performance due to joint and complementary actions and fewer risks related to the innovation, development of synergies and research methodologies capable of giving answers to the real needs of the operators in the agricultural sector.

In this context, QUBIC, which is the first project that collects systematic information on the traditional pork products in the Mediterranean areas, allowed the creation of a fertile ground for the exchange of knowledge about the successes and the failures related to the practices for the conservation and exploitation of biodiversity of native pig breeds at risk of extinction.

I hope that the numerous results obtained within the QUBIC project can be effectively used by operators in the agricultural sector in order to combine the conservation of biodiversity with a sustainable agricultural production generating value for local communities.

The Councillor for Agriculture and Food Resources
Elio D'Antrassi

The conservation of biodiversity and the QUBIC project

Biodiversity is a key factor for agriculture, given that the diversity and the genetic variability are natural, social and economic resources of fundamental importance.

The possibility of development of agriculture, in fact, depends both on the richness of different genomes and on the possibility to use these genomes for a long time.

Sicily is a reservoir from which genetic resources can be drawn in order to diversify production.

The Island is characterized by an high number of species and biological forms due to its great pedo-climatic variability and its central location in the Mediterranean basin.

Furthermore, many civilizations have lived over the years in Sicily, each one characterized by different eating habits, use of natural resources and agro-forestry-pastoral activities encouraging the selection of several species.

An example of biodiversity in Sicily is the Nebrodi black pig, included in the FAO's World Watch List for Domestic Animal Diversity.

The extinction of the Nebrodi black pig would cause not only a loss for animal genetic diversity but also the exodus from the rural areas, with negative impact on the local economy.

On the base of these considerations, the Department of Infrastructural Interventions for Agricolture carried out several activities in order to protect the breed and to develop the local economy. In this context, the Nebrodi black pig has become an element of strong appeal.

Starting from these experiences, the QUBIC project has been carried out. Its main aims are the conservation of biodiversity of native pig breeds of the Mediterranean area and the sustainable use of these breeds in order to obtain typical quality products and to create new sources of profit for the rural areas.

The biodiversity, if exploited, can be an element of cohesion and growth for present and future generations, as the exchange of experiences and the increasing operators' interest and know how brought out.

Director of Department of
Infrastructural Interventions for Agricolture
Salvatore Barbagallo

1. The Qubic project

Giuseppe Spartà, Vanessa Dioguardi, Giuseppa Gaeta, Alessandro Lazzara, Vincenzo Pruiti Ciarello, Antonio Virzì – Sicily Region

1.1 The Qubic project within the MED program

The QUBIC project idea was drafted from the consideration that the survival of 50% of animal species in Europe depends on the agricultural habitat or that a considerable percentage of farming animals in MED countries are endangered or are at risk of extinction. Particularly, the shift from a traditional agriculture to modern one, the following intensification of agriculture and the leaving of these areas have changed the agricultural habitat, exposing a considerable percentage of farming animals to the risk of extinction. In this sense, the project arises from the need to settle the preservation of habitats as it could be a source of profit for rural areas. Besides this economic and environmental analysis, consumers' demands of gastronomic products have been steered into high qualitative products, consistently with the socio-cultural context. Thus productive chains have adapted their productions to this evolution in consumers' habits, leading to the development of niche products.

As traditional meat based products are widely spread all over Europe and a wide variety of cured meats typically produced in areas concentrated around the Northern Mediterranean shores, the QUBIC project aims at pointing out the features of making a typical and quality product. After collecting and arranging norms and experiments to establish a positive transfer mechanism that will lead to the preservation of typical features within an efficient production and distribution system.

As the project generally aims at providing new opportunities for funding and diversifying the source of income of the peripheral areas, local resources will be improved as well as the production-transformation-distribution system, by means of transfer of innovation.

First of all, a gap assessment of the productive chain was drawn up, taking into account animal breeding, welfare, hygiene and bio-safety, environmental quality and use of natural resources, working and transformation techniques. Afterwards, the evaluation of training and technological needs was carried out, so as to define production techniques oriented to the valorisation of typical meat products of the Med area. As a third step, the rationalization and organisation of the chain were essential, in order to improve the market value of training actions and technological transfer activities. This phase al-

lowed collected information to be transferred to small and medium enterprises, increasing their entrepreneurship and improving territorial cooperation.

The project involved countries facing similar environmental and sociocultural challenges: Spanish, French, Italian and Greek producers have to constantly deal with climate change and critical accessibility of marginal areas.

Qubic is a project of the Med program, a transnational program of European territorial cooperation, financed by the European Union. Its objectives are the improvement of the area's competitiveness in order to promote growth and employment for the next generation and the promotion of the territorial cohesion and environmental protection, with a view to sustainable development.

The program is articulated in 4 axes:

1. Strengthening innovation capacities
2. Environmental protection and promotion of a sustainable territorial development
3. Improvement of mobility and of territorial accessibility
4. Promotion of a polycentric and integrated development of Med space

The Qubic project is part of the first axis, in particular falls under the objective 1.2: Strengthening cooperation between economic development stakeholders and public authorities.

The chosen priority axis aims at facing regional disparities and the high level of fragmentation of economic operators by enhancing endogenous resources and by ensuring the implementation of the sustainable development principle. Positive spin-off on local economies involved by QUBIC project is coherent with this general aim as it combines economic development with protection of the territory. Local authorities and private actors of the productive chain cooperated in order to organize the components of the chain within a sustainable approach. The first phase of the project led to the sharing of technological and analytical data about delicatessen products of the MED area. The activities were implemented both in the laboratories of the firms and in the seasoning centers of Sicily, so as to guarantee a close coordination as suggested by objective 1.2 of the program. The final transfer of information to small and medium enterprises will increase local entrepreneurship assuring an efficient and sustainable productive chain and will improve transnational synergies by means of a new approach. The choice of the cured meat products sector meets the objective of the program leading to a sustainable development and a diversification of traditional economic fields of the MED area.

Furthermore, partners participating in the project share the mission of in-

creasing competitiveness capacity of the agro-industry and agro-food sector, particularly for the SME and producers placed in peripheral or rural areas. The challenge to do so in respect to the ecosystem is what allows for durability of the potential growth engendered within the project. QUBIC intends to foster the competitiveness on the basis of sustainable use of local resources, which implies preservation of biodiversity of the resource itself. Such an approach activates a virtuous cycle making the maintenance of the biodiversity a precondition for the possibility of effectively obtaining a more successful product in the market.

1.2 General and specific objectives of the project

The general aim of the project is providing new opportunities for funding and diversifying the source of income of the peripheral areas. This will be achieved by renovation and innovation of the chain of production and distribution of cured meat products. While taking into consideration the importance of animal biodiversity as the basis for obtaining a typical and high quality product. These opportunities involve positive spin-offs on local economies both in terms of employment and protection of the territory. The aim will be achieved through the valorisation of local resources, so as to prevent a loss of animal biodiversity, and through a transfer of innovation into the production-transformation-distribution system of meat products.

Three specific objectives can be identified:

1. Settlement of the framework and current status of the production of animal origin products, through the examination of the several aspects involved in the production chain;
2. Evaluation of training and technological needs in order to achieve a higher level of efficiency and sustainability;
3. Rationalizing and organizing the chain: a document integrating the project field into the distribution and market context has to be based on cognitive and training experiences.

Above all it's important to organize the components of the chain within a sustainable production approach, so as to improve the market value of training actions and technological transfer activities.

1.3 The articulation of the project

The Qubic project is articulated in the following components:

– *Component 0 - Project development and preparatory meetings*: it con-

cerns the development of the project idea. Two meetings were held, one in Palermo and one in Rome. Qubic project idea has been developed on the basis of previous cooperation experiences carried out in Nebrodi Park. QUBIC proposal started circulating as a project about the maintenance of animals, the quality of environment, and about possible paths for the differentiation of the productions, fostering competitiveness of traditional products of the MED area. Partners have participated in the preparatory meetings, each ones contribution has been added to the application form and budget creation.

- *Component 1, articulated in 4 actions:*
  - *Action 1 - Publication and dissemination of joint leaflets/communication materials:* it concerns the definition of the project communication action plan. Communication and dissemination activities were carried out all along the project under the coordination of lead partner but all partners gave direct contribution to the interregional dissemination activities and to the local ones, each one to his competence.
  - *Action 2 - Setting up of the project website and regular updating:* A web platform was developed with the aim of being a tool to coordinate participants and disseminate the project results to the whole public. The platform will also be an e-commerce portal in order to promote traditional meat products. The website offers information about the project to the general public and the public information can be useful to all its potential audiences.
  - *Action 3 - Organisation of local events to disseminate results and outputs:* Local events will be organised at the beginning of the project and at any important achievement so as to disseminate the results and to present the outputs.
  - *Action 4 – Final conference* - The Final Conference will present the main outcomes, products and results of the project. Each project partner will participate with a lecturer presenting the activities and the outputs produced. During the conference a video will be presented summarising the seasoning experimental sessions, training sessions and networking events.
- *Component 2, articulated in 4 actions:*
  - *Action 1 - Kick-off meeting:* The tasks related to project management, as well as those referring to the co-ordination of tasks, decision making, and sharing of responsibilities among partners, are defined in a Partnership Agreement and were further illustrated during the kick off meeting. Partners were informed about project technical and admin-

istrative procedures, as well as programme procedures (i.e. auditing, reporting, etc.).

- *Action 2 - Organization of Project Steering Committee meetings:* The PSC may hold physical meetings or synchronise their work through intense mailings.
- *Action 3 - Project management and coordination:* the partner's day-to-day management of administrative and technical tasks of the project. Project Steering Committee met twice a year, functionally with the preparation of the Progress Report, for correct and regular monitoring of the activities.
- *Action 4 - Monitoring and control of incurred expenditures:* Financial management consist of monitoring the state of expenditure, submitting partners' demands for certification of expenditures, checking the validation of partners' expenditures by National Auditors, ensuring consistence of expenditures with agreed activities.

– *Component 3, articulated in 5 actions:*
  - *Action 1 – Map of farm features:* it concerns mapping and deeply analysing swine farms feature; identifying animal growing and breeding practices, observing of physical conditions, nutrition and hygiene; registration of the feeding systems and breeding practices (products used as animal feed and their impact on the production of high quality typical products); morphological evaluation of the different genetic types in each animal population (live animals).
  - *Action 2 – Map of territorial features:* The territorial features were analysed so as to characterize the consequence of the situation in a particular territory for the production process, but also the impact of this production process back on the territory. Particularly, the identification of the characteristics of the production environment and of its potential consequences on the products (micro pollutants, management of strategic resources such as oak trees and chestnut trees) were made. Furthermore, partners studied the characterization of some specifics of the territory (cultural, organizational) that can influence the final products and the characterization of the impact of the production process on some aspects of the territory features (spatial distribution of activities, links among operators; questions of slaughterhouses).
  - *Action 3 – Map of production techniques:* it concerns the analysis of the production techniques referring to the typicality of the products and also mapping the most important manufacturing parameters through specific forms (anatomic cut features, preparing methods of

the curing mixture, ingredients, seasoning techniques, environmental thermo-hygrometric parameters). Furthermore, during this phase the most innovative techniques were identified, in order to optimize the production during the different production steps including animal feeding. Chemical and physical tests on a large range of products (traditional ones vs. those from modified animal feeding techniques) were made.

- *Action 4 - Map of the distribution network:* The analysis of the distribution network and their inherent chain configurations were identified in order to characterize food chain players, type of meat products, type of raw materials, commercial logistics flows, structure of enterprises, degree of integration among food chain players, bottlenecks in traceability, etc. The methodology foresaw links with national and international projects in related areas, surveys, trade studies, interviews with key players. Partners in their geographical areas mapped and designed representative cured meat food chains in order to set up representative upstream food chains configurations (from feeding producers to slaughterhouses).
- *Action 5 - Gap assessment and work plan for valorising the production:* it concerns the identification of gaps and strengths in the analysed areas (animal health, environmental impact, production techniques and distribution network); the development of a plan of intervention for overcoming existing gaps and for valorising production techniques of swine products. The rationalization of the chain defining the most significant manufacturing standards; the realisation of geographical and conceptual maps representing the actual scenario in MED partner countries.

– *Component 4, articulated in 4 actions:*
  - *Action 1 - Transfer of technical knowledge: in this area, training seminars for the technologic transfer were organized*. The results of previous actions were transferred to operators through dissemination seminars and specific courses focused on breeding and production techniques. The objective was to protect and improve the production of typical products and to assure a competitive, sustainable and regular production. Seminars were locally organised by each partner for local stakeholders and foresaw different content depending on the audience.
  - *Action 2 – Networking:* networking events for the exchange of experiences among the operators of different phases of the chain were organized. The Region of Sicily hosted a transnational networking event

with stakeholders from all partner's regions. The stakeholders involved include: national policy makers, representative from all stages of the distribution chain, producers associations and coops, small producers and farmers, distribution representatives, researchers involved in the project.

- *Action 3 - Support to SMEs development:* bilateral meetings with SMEs for enhancing their innovation capacity and competitiveness by means of transfer of know-how were organized. The selection of the target SMEs was made and a bilateral meeting was organized. Furthermore, some joint management opportunities of some phases of the chain were identified.
- *Action 4 - Realisation of different seasoning techniques:* Local experimental sessions on seasoning techniques and training courses for local operators and producers were made. The operators were invited to the experimental centers and visitors demonstrated several different seasoning techniques which can be put in place for different meat and meat cuts.

1.4 Expected results

Qubic aims to map the typical and traditional meat products in Mediterranean countries adopting a comprehensive approach.

Moreover, in order to increase competitiveness on the basis of the inner value of local breeds, QUBIC characterize the animal biodiversity to promote the value of local resources.

QUBIC among its action will characterize the local pig breeds and valorise them in the frame of the production of high quality typical products. The project represents a real lever for the productive fabric for local producers, local governments, small companies, which would be especially supported in their strategy and in their market goals.

Project partners' structures could represent an effective link between public and private sectors.

QUBIC project aims to build a model of public-private partnership to become a practice able in adapt in different sectors and other rural economies.

QUBIC fits perfectly with the strategic lines marked by the regional government and local administrations. And adds an important aspect to it: the recovery of pig breeds, as the link in a chain of value related to the conservation of breeds, to the preservation of habitat and the products of high quality.

Furthermore QUBIC project will have a positive impact on the environ-

ment in terms of increased sustainability in the agrifood sector concerned with the production of cured meat products. The condition for an increase in the competitiveness of this sector is the quality of typical products which is linked to environmental conditions. QUBIC aims to transfer knowledge and technology and implement sustainable practices in the management of small farms will serve to improve the overall value of the production-distribution chain, preserving animal and environmental natural preconditions. Despite the fact that environment it is not the first target of the project, QUBIC will have a positive spill over on several of the environmental aspects.

1.5 The partners

The partnership of Qubic project consists of 7 partners:

- AINIA (Spain – Comunidad Valenciana): is a technological canter formed by more than 1100 companies in the food sector and related industries. The legal status of the centre is that of a private non-profit association which aim is the promotion of innovation, research and technological development (www.ainia.es)
- TUSCANY REGION - Directorate General "Competitiveness of the regionale and skills development": is a regional public administration and succeeded ARSIA (Regional Agency for development of innovation in agriculture and forestry) that led the project ,on behalf of the Region, up to 31 December 2010.
  The Tuscany Region has developed an intense activity for the conservation of biodiversity with the approval in the mid 90s of a regional law on the protection of autochthonous animal and plant gene pool (LR 50/97).
  In addition, through its Agency (ARSIA), has promoted an intense research activities for the conservation of indigenous breeds of animals and the valorisation of production resulting from the breeding of these races among which is the Cinta Senese pig breed.
- CHAMBRE D'AGRICULTURE DE LA DRÔME (France- Rhône-Alpes): provides support to farmers in starting breeding activities of birds. Moreover the Chambre d'Agriculture de la Drôme contributes to the creation of protocols on the qualitative aspects, technical, health and food and offers a training program tailored to the needs of the production.
- INA CERTH (Greece – Kentriki Makedonia): is an Institute of Agro biotechnology (INA) having as mission to conduct basic and applied research and promote innovation in the field of Agro biotechnology. INA's main objective is the development, application and use of modern technologies and

innovation in the production of improved seeds and propagation material, aiming to the solution of important cultivation, food processing and agro industrial problems, in general (www. http://ina.certh.gr/ina_home.htm)

- INRA (France – Corse): INRA carries out mission-oriented research for high-quality and healthy foods, competitive and sustainable agriculture and a preserved and valorised environment. Its research is guided by developments in scientific fields and focuses on worldwide challenges related to food and nutrition, the environment and land use facing the world of agriculture and agronomics today (http://www.corte.inra.fr/Irde2)
- SICILY REGION – Department of Agriculture (Region: Sicily - Italy): is a regional public administration and is the Lead Partner of the project. The Department was involved in several transnational projects, such as Archimed, project T-CHEESE.MED – "New Technologies for traditional and historical cheese production in the Archimed Area"; MEDOCC project C.I.M.P.A. -"Meridian food and parallel monuments". The Department of Agriculture is also the lead partner of the project RURAL MED: network of exchange of experience on rural development, Programme Leader +, Sicily 2000-2006, Axis 4 – Measure 2.2 – Transnational cooperation (www.regione.sicilia.it).
- SSICA (Italy – Emilia Romagna Region): The Experimental station for the food preserving industry in Parma, now special Agency of the Chamber of Commerce in Parma, is an Institute for applied research, operating with the specific aim of promoting the technical and technological progress in the Italian fruit, vegetable, meat and fish processing industry. SSICA is one of the most important institutions of applied research in the food preservation sector existing in Europe and in the world (www.ssica.it).

2. Description of breeds of swine in the Med Area

2.1 Nebrodi Black Pig

Vincenzo Aronica and Vincenzo Di Marco - Sicily Region

Picture 1 – Nebrodi Black Pig

The black swine of Nebrodi is an autochthonous breed of swine typical of the Sicilian Mountains chain (Nebrodi) located in the north-east of the island. The black swine is mainly located now in the mountain areas in the province of Messina but some farms are present also in the province of Palermo and Ragusa. It is considered a breed at risk of extinction by the FAO and its management is a cultural patrimony transmitted from one generation to the next. Until recent years the utilization of these animals represented only a very marginal income for the animal farms of that area and a way to use low quality remnant of agricultural productions that were used to feed the swine. The mountain forest and the Mediterranean flora at the boundary with agricultural areas represent the main feeding sources for these very rustic animals, well adapted in their natural environment. The black swine has been present in Sicily since ancient time judging from fossil samples; it was surely present during Greek and Phoenician period in Sicilian history (VII-VI BC).

The origin of the breed is not exactly determinate but it was, probably, very similar to a common race present in all Mediterranean areas: a small dark swine, with a hard crest on the back. Those animals are still present in some regions like Sicily, Calabria, Spain, and Corsica. Until the beginning of the 20th century numerous autochthonous breeds were present in Italy and the Black swine of Nebrodi was mentioned in a list of 1922. The mount Nebrodi area is a very interesting region for the landscape, the richness of flora and fauna and is particularly important for a high biodiversity. The environment of these animals is very peculiar and suitable for a high quality swine production. The breeding area can be considered in three well defined territories with different morphological and vegetative characteristics. The first territory is the Mediterranean plan from the levels of up to 600-700 meters. The flora of this first territory is characterized by the presence of evergreen oaks: *Quercus suber*, *Quercus ilex*, *Quercus pubescens etc*. The second area is from 800 up to 1200 meters with the presence of other type of oak like *Quercus cerris*, and other trees species like *Pyrus pyraster*, *Malus sylvestris* and *Prunus spinosa*. The 3rd territory is from 1200 to 1400 meters with the predominant presence of *Fagus sylvatica*, forests. The wild black swine is an animal of medium-small size, 60 – 72 cm high and an average weight of 130 Kg for the adult female and 160 Kg for the adult male. The body is covered by the black bristles that on the back form a kind of crest similar to the wild boar. Some variants present white forehead and mouth and some others have uniform grey bristles instead of black. They have a long head, small ears and small neck. The legs are long and strong with black and resistant claws typical for highly moving animals. Sexual maturity is reached at 8 months by the male and a little later by the female. Two offspring mainly at the end of winter and the beginning of spring with 7-8 newborns each can be present in one year and almost all of them reach the weaning stage. The reproductive period is longer than in other swine breeds, reaching frequently 6-7 years. The piglets are milk feeding up to 40-60 days. At the weaning time they start, grazing freely in the forest, eating what they find in the forest like herbs, roots, tubers, acorns, and wild fruits. A few months per year they are gathered in rural shelters in the farms and are feed with seeds (corn, wheat etc.) especially before the slaughtering or they follow the other livestock animals in the transhumance.

The pure breed animals have a lighter weight compare to the selected strains of swine or to the crossbred animals and in fact after one year the weight is only 50-60 kg with high fat masses in the neck, withers, back, and lumbar regions. This accumulated fat is important to overcome the months

with shortage of food. The genetic background of this breed makes them particularly adaptable to the climatic and environmental conditions of their habitat. It can be particularly hard for them to find food in the winter time due to the snow and in summertime due to droughts. During this critical period breeders integrate the food supply with cereal seed and legumes.

In the last decade the Black swine of Nebrodi is bred with the following different modalities:

• In the wild, freely grazing in the forest, all year round;

• In semi-wild in which they are grown into the wild and in the farm seasonally: from April to July in the forest, August -September in the farm shelters taking animal feeding, October –November back in the wild. In winter time they follow the other animals (cattle and sheep) in the transhumance or they are back in the shelters with integration of food supply by cereal flours and legumes

• Outdoor system which consist in keeping under control the animals in a defined territory but still in their natural environment. Some breeders modified the management of the black swine of Nebrodi animals to increase the number of the animals controlled and to better organize the line of production. This kind of breeding respects animal welfare because the animals are able to graze freely on the farm. Well-organized but traditional shelters are used for the deliveries and the milking period, reserved to the mother and piglets. The shelters are made in a traditional way. They are very rural huts in the shape of a cone (*zimma*) made by a base made of circle wall of stones as high as 20 to 100 cm from which several longitudinal wood axes depart. The tip of wood axes are linked together to form the cone which is then covered by the leaves of the ferns and/or the brooms and mud. Inside this kind of shelter the temperature and humidity is very comfortable for the animals. The feeding is natural grazing and the usual integrations with cereal flours and legumes from Sicilian productions are made in the periods August-September and wintertime. The animals raised in this way reach higher body mass than the ones raised into the wild, although they live in very natural and good conditions.

The animals are ready for the slaughtering:

- At 9 months (70-90 kg) for meat

- At 12-14 months (90-120 kg) for meat suitable to be transformed in salami etc.

There are several typical products made with the black swine meat and all of them are high quality products, probably due to the very special environment in which the animals live. An environmental study in this area of

Sicily that is a natural conserved park (Park of Nebrodi) revealed that no contaminants like PCDD/F, DL-PCB or PBDE were present in the fat of the swine of the farms, and very low level in the free grazing animals (that can be more exposed). Moreover a study on the level of DHEA-S revealed that farmed animals that do not have the choc of the capture showed higher levels of neuro-steroids indicating good psychophysical status.

A study conducted on the presence of reactive metabolites of the Oxygen and on the antioxidant capacity of fat content in the transformed products showed that the black swine of Nebrodi contains a fat that is less prone to the acidity process, rendering the products well conserved for longer time.

All these aspects are important for the European consumers that are becoming more and more concerned about the animal welfare and the food safety and quality. The rural areas, that maintain traditional management on animal breeding and traditional processes in food transformations can gain economic benefits by promoting their own productions made in area in which pollution and industrial type of farms are almost absent and taking care of the biosecurity along the production line. Today the black swine of Nebrodi is a slow food presidium; fresh meat and cured and salted products are highly appreciated and the regular procedure to be considered PDO product has been started in 2005. The breeding of these animals can be considered a big opportunity for a positive economic impact to the future generations of this territory, to limit the exodus of the young generations keeping a traditional or slightly modified farming system, in the respect of the natural environment and biodiversity.

2.2 Mora Romagnola

Carlo Diaferia and Pietro Baldini - SSICA

The *Mora Romagnola* is a local breed that like many other old species is perfect for rising outdoor. It has distinctive dark brown skin tending to black, hence the name “Mora”, unusual almond-shaped eyes and particularly long tusks, especially in the males. These characteristics make the animal more similar to wild boars than the other breeds of pig. The *Mora Romagnola* grows much more slowly than the Large White and its meat has more fat content. The nearly 22,000 heads that existed in 1949 were reduced to just 12 in 1997. Thanks to the help of the WWF and the Department of Animal Husbandry Sciences at the University of Turin, a program was devised to recover the breed and appraise the quality of the meats. The *Mora Romagnola* meat is perfect for making excellent cured meats.

The local process of implementation of the pig bred *Mora Romagna* is

progressively becoming very important in the territory, supporting the breeding sheep, and represents not only the production aspect, but also plays a role in the exploitation of marginal lands, or abandoned, where the presence of the ungulates involves a favourable effect on soil compaction and a constant cleaning by brambles and weeds with extremely beneficial effect on the characteristic flora and safe preventive effect on the propagation of the fires, as in under-woods not treated. Furthermore, it is now common knowledge (not only among farmers) that the link between this type of territory and the *Mora Romagnola* has been for centuries so intense that it has influenced in a decisive way, the characteristics of the phenotype, expressing then a real identity-area product, which places the *Mora Romagnola* as a resource, not only productive but also cultural and participating to the traditional characteristic of the Apennine Faentino.

The strong aggregation between farmers and integration of sector led growth and development of farms as well as improving the quality of productions. Farmers with the support of APA and the Ravenna CO.PAF (Consortium for the Protection and Improvement of the Breed Mora Romagnola) are focusing energies on preserving the pure breed. The practice of the cross-breeding, even if valid, and also already experienced (as highlighted by the historical references) on first generation hybrid called "Fumato di Romagna", it is not currently the object of interest, as, if not carefully controlled, may become possible threat of a slowdown or loss of the path of knowledge and development of *Mora Romagnola*.

2.3 Nero of Parma

Carlo Diaferia and Pietro Baldini - SSICA

The *Nero of Parma* pig is the result of a recovery project which began in the early 90's by local authorities and farmers fans, which have sought signs of Parmesan Black breed in the province of Parma. The work of selection and study of morphological aspects, thanks to the continuous comparison with bibliographic texts has resulted in the recovery of the pig and the recognition by the National Swine Breeders genetic type as *Nero of Parma* hybrid. From the 90s to the present, the black pig has spread widely in parmesan area and its features and quality of the meat came in other districts. Alongside some of the pig breeders that came together in combination and in a consortium developed, together with institutional bodies, a trademark to identify products derived from meat of *Nero of Parma* pork.

Farms consider that the animal is particularly suited to this system of rear-

ing. Some of those who have experience with other native breeds believe that the *Nero of Parma* is even sturdier and more suited to outdoor rearing. One of the farms that rears in pigpens confirms that the animal adapts very well to being reared indoors, but in the event of health problems, the *Nero of Parma* is more susceptible than the white pig reared under the same conditions.

The *Nero of Parma*, as stated by the farms, is: the animal's low growth rate (on average it reaches 180Kg over 16 months), low fertility and the loss of piglets crushed by the sow and the development of an excessive fat layer if the feed is not particularly adapted. Considering these characteristics, the breeder must use all the practices necessary to limit and contain these criticalities. Breeders underline the importance of being aware of the animal's defects and adopting the practices and care required to limit them and enhance the animal's potential.

With regard to the capability and diversity of an animal in the herd, no points of particular interest arise, except for morphological aspects which are important for selecting the reproducers. For many farms, thanks to the selection process, morphological characteristics are rather uniform. Other farms confirm, however, that there are morphological characteristics which are still rather diversified in the pig population and that, for this reason, selection should be aimed at greater identification of the animal leading consequently to the improvement of the meat's special characteristics.

The pig displays the characteristics of the herd, and these phenomena are in part lessened when the management of the farm, the feed, and the number of animals in each enclosure, is such to limit aggression and dominance (for example, larger available surface, freely available feed, availability of straw and hay).

The selection criteria used on the animals destined for reproduction are, in most cases, docility (considering the problem of the sow crushing the piglets) and attention to the litter by the sow, reproduction performance and, later, morphological characteristics (information for processing).

2.4 Iberic Pig

Jorge Molina Villanueva - AINIA
Juan Luis Ortíz Pérez - PDO Jamón Ibérico Los Pedroches

The Spanish Ministry of Agriculture, Fisheries and Food's publication describing the Iberian pig states that its origins lie in the crossing of the "*Sus Scrofa Feres*" and the "*Sus Mediterraneus*". Although authors on the subject disagree to a certain extent about their origins, they nonetheless all coincide that the subgenre "*Sus Mediterraneus*" is its predecessor.

This type of pig populated the countries on the Mediterranean and African coasts and came in through the south of the Iberian Peninsula to occupy its south-western area in Western Andalusia, Extremadura and Salamanca in Spain and the Algarve and Alentejo in Portugal. In the process it became everlastingly tied to the ecosystem of the *dehesa* in this region.

It was the most common type of pig until the second half of the 20th century, when it was displaced by foreign species with higher meat yields and carcasses with less fat which became more popular in Spain around that time. This led to the appearance of a new type of Iberian pig farming involving smaller, younger animals that were more appropriate for sale in butcher's shops. Nevertheless, this latter type of livestock did not become predominant and traditional pig farming in the *dehesa* survived because its products, mainly ham, shoulders and sausages from Iberian pigs fattened on acorns and grass using extensive mast-feeding farming methods in Spain's *dehesa*, remained extremely popular among consumers. However, the change that would become most significant later on was the introduction of crosses between the Iberian pig and foreign breeds in order to achieve greater pig growth and higher meat yields, crossbreds that have come down to the present day and have also been officially recognised with the name "Iberian".

In terms of its characteristics, a dry Iberian breeding sow can weigh from 120 to 150 kg and breeding male pigs from 150 to 220 kg. The weight of fattened pigs ready for slaughter in traditional production can vary widely depending on many factors, but commonly it is between 150 and 180 kg, with older slaughter ages that range from 14 to 20 months.

From a morphological point of view, the Iberian pig's head is narrow and smaller than other kinds of pigs, with a long snout and a very inclined rooting disk. It has a large dewlap and small eyes. Its ears are different lengths and shapes, generally medium and narrow; Retintos have ones shaped like the eaves of a house, while in Negros Lampiños they are longer and bent into the face. The belly is bulky and patent in breeding sows. The hind legs usually have a small bone diameter with thin shanks, something which is much appreciated by consumers.

The Iberian pig has more intramuscular fat than other, more industrialised pig breeds. This fat, and especially in the case of mast-feeding pigs, provides the juiciness and aroma that make Iberian pig products so popular among consumers.

AECERIBER, the Spanish Association of Iberian Pig Breeders, has produced the *Libro Genealógico de la Raza Porcina Ibérica* (Iberian Pig Breed Stud Book) since 1987.

The Iberian pig has evolved over time as the physical separation between populations has led to great intra-breed diversity and heterogeneity. This has come down to the present day in the shape of strains and lines that traditionally have been differentiated by morphology, although there are also considerable genetic differences between them.

The most common classification of these varieties is based on the colour of their skin:

- Black varieties: this breed group deposits the most intra- and inter-muscular subcutaneous fat and in general it grows faster. Three black varieties have been described.
  - The Lampiño. This is the most significant example of Iberian pig because it is the least evolved. It includes various strains of Spanish origin such as the Guadiana or Guadyerbas, the Serena and the Portuguese.
  - The Entrepelado, a variety that comes from a cross between the Retinto and Lampiño varieties. Along with the Retinto it is one of the most widespread varieties in Spain nowadays.
  - The Negro de Los Pedroches, an Iberian pig variety that originated in the Los Pedroches Valley in the north of the province of Cordoba from an old native population generated by decades of breeding. Today, it is at risk of extinction. It has excellent production capabilities that justify its characterisation and preservation.
- Colored varieties:
  - The Retinto or Retinto Extremeño is the most widespread variety of Iberian pig as it is highly adaptable, has good growth capacity and good carcass yield and a higher proportion of muscle than the other varieties of Iberian pigs. Its thin legs make it very popular with consumers. Different strains are commonly given different names, including Villalón, Valdesequera, Silvela and Mamellado, which some authors argue is a separate group due to the presence of udders.
  - The Rubios including the Campiñes and the Dorado Gaditano, both of which are thought to be virtually extinct.
  - The Torbiscal, which is a synthetic variety developed by Miguel Odriozola on the Dehesón Del Encinar farm in Oropesa (Toledo) consisting of two Spanish and two Portuguese lines. It has excellent meat and production qualities and is very hardy.
  - The Manchado de Jabugo is the strain with the greatest differences and genetic gap from the rest. This is physically apparent as it is light in color, with black or dark grey unevenly distributed spots of variable size. It is now in danger of extinction.

In 2007, the Spanish Ministry of Agriculture's Breeds Board approved the recognition of the four major strains of Iberian pig in the breed's Stud Book and in the Official Catalogue of Livestock Breeds of Spain. Two strains are listed for general development, the Entrepelado and the Retinto, and two others for special protection, the Negro Lampiño and the Torbiscal. Subsequently, the Manchado de Jabugo was included in the Catalogue.

The Iberian pig and its extensive farming husbandry using the natural resources of Spain's *dehesa*, mainly acorns, is one of the most representative examples of the extensive livestock tradition in Spain and a perfect illustration of an animal's adaptation to its surroundings and environmentally friendly livestock production. So much so that the image of the Iberian pig is always linked to the *dehesa* and the *dehesa* to the Iberian pig. Hence it seems appropriate to give a brief overview of the current situation of this ecosystem.

The *dehesa* is an agro-silvo-pastoral system whose main economic activity is livestock. It was created by humans from the original Mediterranean woodland through thinning, cleaning and clearing. It occupied much of the Mediterranean basin at the beginning of the 20th century but owing to its dubious economic viability it has gradually been replaced by other crops such as cereals in Spain and olives in Italy. Today, it is practically confined to the southwest and west of the Iberian Peninsula.

This type of land use has created a plant landscape that basically consists of two layers: the first is dominated by grassland or crops, while above it there is a woodland layer mostly made up of species of the "Quercus" genus (largely holm oak, cork oak and gall oak).

The most accepted origin of the term "dehesa" dates from the Middle Ages and comes from the Latin word "deffesa".

It is a complex and delicate production system and managing it calls for knowledge of livestock, forestry and agriculture. Decisions made there affect not only the owner but also society in general, as it is considered to be natural and cultural heritage and a crucial landscape for keeping people in the rural areas they live in.

Today, many authors argue that this delicate balance that sustains the *dehesa*, and which requires human intervention for its continued existence, is seriously threatened by a number of different factors which nonetheless all have a common starting point; the unprofitability of farms due to the lack of appreciation of the products obtained from them.

This lack of appreciation of products from the *dehesa* can best be seen in Iberian pig products despite the registration as PDO of 4 types of products

deriving from the Iberian breed (including "pure Iberian" and "Iberian" that means crossbred).

Consumers' traditional perception of Iberian pig products, as coming from a traditional extensive farming fattening system in the *dehesa* using acorns and grass, was altered following the appearance on the market of Iberian breeds crossed with other foreign pig breeds, and produced using intensive, fodder-based farming systems that had nothing to do with the *dehesa* yet were still sold under the "Iberian" brand name that consumers recognised.

In many cases, excessive pressure on the woodland layer in the *dehesas* and on the tree regeneration necessary for its renewal means that in general there is insufficient replenishment of the contemporary *dehesa*'s woodland, which consequently is in the main elderly and in many cases damaged to some extent, with further harm caused to soil structure and increased erosion and degradation of natural grasslands.

On-going support is therefore required from all stakeholders to preserve the *dehesa* system and all its associated biodiversity.

2.5 Greek Pig

Notis Argiriou – INA CERTH

Greek pig (black pig) is a traditional indigenous breed. It was domesticated many centuries ago and was raised in order to provide meat and leather to almost every Greek family living in rural regions. It is a product of natural selection that was able to adapt to different and harsh environmental conditions. It was the only pig breed raised in Greece until late ´60s.

Actually, there are only two breeders in Greece intensively raising this breed, with their farms counting 200 sows in total. These small nuclei are located in central Greece.

Concerning Greek pig's morphology, its body weight (live weight) ranges between 80-130kg and it is closely related with the breeding system. Pigs living in mountainous and inaccessible areas are smaller in size, in contrast to those living in semi-mountainous areas.

Breed's dominant color is black and dark grey. They have slightly falling ears and middle size snout.

The animals are generally fed on free range, grazing on oak-forests. They are nourished with concentrates only during the mating season.

Sows perform a seasonal reproductive activity and produce two litters per year, consisting of 8-10 piglets at birth. They reach reproductive maturity at the age of 8 months. Mating operations are performed in the field and are not

Picture 2 – Greek Pigs

selected by the farmer (free mating). Boars are usually bred for reproductive purposes for about 4 years.

Weaning takes place 6 weeks after kidding. Body weight of piglets at weaning is approximately 7,5kg. Only a percentage of 80% of the piglets born reaches the slaughter age, because there are losses due to exogenous factors such as carnivores and unfavorable environmental conditions.

Greek black pigs are very resistant to parasite and microbial infections. As such, there are no serious hygiene problems, despite the absence of any medication, which makes them ideal for breeding. Also, the animals of this breed tolerate bad weather conditions very well.

Nowadays, Greek pig is raised by farmers mainly for meat. Usually, pigs are slaughtered at 240-300 days and a carcass of more or less 50kg is derived. Carcass and meat quality produced by the indigenous black pig vary according to the slaughter age and season of birth of the animals. The meat consists of thick fibers, its color is deep red and it has a low intramuscular fat content although a thick layer of subcutaneous fat is present. In general, Greek black pig has excellent meat quality, of great organoleptic characteristics.

Till recently, there were no meat products from Greek black pigs. Since Qubic project started a small pilot production of pork cuts from Greek black pig is present in the market, such as Greek hammon (named “melan akrokolion”), sausages, bacon, ham, salami, lonza etc. The high quality of Greek

Picture 3 – Greek Pigs

black pig products makes this breed special among the other breeds raised in Greece. Alongside, its great adaptability makes the Greek black pig breeding ideal for regions with special environmental conditions.

Picture 4 – Greek Pigs

2.6. Breed recovery in the Plana de Utiel-Requena

Jorge Molina Villanueva and Alfredo Rodrigo - AINIA

Historically, in the region of *La Plana de Utiel – Requena* (Valencian Region; Spain) crop production has been more important than livestock farming. The typical livestock production was traditionally small ruminants (sheep and goats) which made use of the existing pastures. Pig farming was a minor production, although there was a strong tradition of pig growing for personal consumption. There were also small pig farms to satisfy the demand of a local butcher industry, which was originated after the extension and industrialization of the traditional familiar slaughtering.

In all cases, pig farming represented a small-scale industry. This production was not associated to the use of natural resources from plants corresponding to the genus *Quercus* (holm oaks, kermes oaks, gall-oaks, cork trees, oak trees, etc.), as it occurs in other Spanish regions. This is because in this region, there are very few *dehesa* lands with trees of this botanic genus.

Nevertheless, pig production, together with poultry production, has played a critical role in maintaining the rural population. Moreover, it constituted a complementary agricultural activity to increase the low familiar income, gaining a relevant social importance.

The region is located in the province of Valencia. Today in this province, pig production is the most important livestock industry, with the highest number of heads, and represents 67% of total livestock heads. In the following table, the distribution of farm animals' census is presented for the province of Valencia and for the Valencian Community. The relevance of pig production is evident.

Tab. 1 - Total number of animal heads according to the animal species in the province of Valencia and in the Valencian Community

ANIMAL SPECIES	VALENCIA PROVINCE	VALENCIAN REGION
Sheep	159,489	432,279
Goat	254,80	86,231
Cattle	251,94	59,018
Swine	418,260	1,157,234
Source: C.A.P.A[1]. (2007)		

1 CAPA: Consellería de Agricultura, Pesca y Alimentación (Valencia – Spain)

The characteristics of the pig production in La Plana de Utiel – Requena are those typical for the Spanish livestock production, but even more specialized in this region, considering pig production has a very high relative importance in La Plana de Utiel – Requena, compared with other regions in the province of Valencia.

The following characteristics related to the pig production should be highlighted:

- There is a strong tendency towards intensification, which has been a generalized tendency in Spain since the sixties.
- Pig production is independent from land in order not to compete with crop production for this resource.
- It is highly complementary with agriculture.
- Pig and poultry production has increased more than other species because they have been easy to establish and it is easy to obtain the necessary resources.

The Spanish livestock sector, and therefore also in this region, has been characterized in the last forty years by a dual character this has been imposed by changes in the demand of food products. The climatic conditions, characterized by strong thermal variations and scarce seasonal rains are also determinant factors. This still existing duality, replaced the previous livestock production, which had an extensive character, linked to the land, hardly using technical advances and with no capitalization.

From the sixties in the XXth century, the socioeconomic transformation in Spain involved an increased demand of livestock products, which in turn originated an extraordinary development of the livestock production, mainly intensive, and the Comarca de *La Plana de Utiel – Requena* was strongly influenced by this.

Livestock production and the related feeding strategies changed into selected animals with high conversion ratios. In this sense, many foreign breeds, mainly fast growing and high prolificacy animals were introduced in Spain. This process was gradual but fast, and it meant the substitution of almost all Spanish breeds from the beginnings of the sixties in the XXth century. The Spanish breeds were more adapted to climatic conditions, but their reproductive indexes were lower in almost all aspects, resulting in their disappearance.

For the case of pigs, there were two big groups of native breeds, the Celtic in the North of the country and the iberic in the South. Both were replaced for high productivity animals of the main European breeds: Large-White, Landrace, Pietrain, White Belgian and others. Nowadays a mixture of all these breeds is present in the farms.

The *Comarca* of the *Plana Utiel-Requena* was a transition area between the two main native breed groups so there were no important local breeds, which also disappeared during the sixties in the XXth century.

The QUBIC project has encouraged with their activities the analysis of the current situation in this Valencian c*omarca* and has tried to bring together different stakeholders and create a debate about the importance of the traditional swine farming methods and the recovery of the traditional Spanish breeds linked to the territory in order to explore future business and social opportunities.

Acknowledgment
QUBIC Project wants to thanks the members of "Consejo Regulador del Embutido de Requena (Valencia) and to their President Mrs. M^{a} Luz Pedrón Domingo for their contribution.

2.7 Nustrale Pig

François Casabianca – INRA

– Breeding area

Corsican pig (*U porcu corsu*) has been present on the island since the millennia, since it would have replaced the current Corsican wild boar (turned over at the wild state after a short domestication) in the farming activities. After having undergone during second half of the 20th century, a great number of crossbreeding with selected breeds (mainly Large White then Duroc); Corsican pig was subject of safeguard which made it possible to recover the pure breed. This breed shows a growing presence in the farms since its official recognition and concerns all the traditional zones of production (mountainous areas).

– Description

Corsican pig breeds presents format from average to small: an adult female weighs 140 to 180 kg and a male 200 to 240 kg. The head is fine and lengthened with a mobile snout and semi-falling ears. The Corsican pig can show crest on the back line as well as pendant (*pindini*). The colored patterns are multiple and based on the following colors: black, red, grey and agouti. The shapes of extension of the white can be added again to the patterns: belt, head, feet, etc.

– Characteristics and specific abilities

Corsican pig is a slow growing breed. The animal is characterized by its hardiness and its aptitude for walking. Reared in sylvo-pastoral extensive

system, it valorizes pasturelands and the areas of chestnut-trees and oak-trees during the autumn. It can also use the mountain pastures in transhumances in zone of altitude (between 1500 and 2000 m.) during summertime.

It is able to undergo periods of low availability in natural resources by mobilizing its body reserves before benefitting again from important resources by a compensatory growth (period of autumnal finishing). It reaches its slaughter weight (between 100 and 130 kg of live weight) at an advanced age from 15 to 18 months, even 24 months.

– Historical presence

Corsican pig was very present during the time of traditional rural Corsica. Indeed, the pig of farmyard (named *mannarinu*) accompanies the life of quite all the countryside families by its capacity of recovery the waste of the kitchen and all eatable foods. The *mannarinu* is thus reared in each family to be slaughtered around Christmas (traditionally slaughtering started in Santa Lucia, on December 13th) aged of 1 year. It is processed into salted products supposed to be consumed during the year or even, for dry ham, during the following year. These products constitute a significant part of the animal protein supply as well as fat content for these rural populations of mountain areas.

This *mannarinu* is bought by the peasant as a piglet weaned about March (*U marzulinu*) to a stockbreeder usually a swineherd (*U purcaghju*) who has a herd of sows reared in the forest (*porcu di banda* or *porcu di furesta*). This stockbreeder carries out his animals in an extensive way and slaughters his pigs at ages more advanced than the *mannarinu*.

Following the progressive disappearance of rural population (and thus the use of the *mannarinu*), this stockbreeder remained until nowadays in the figure of an on-farm processor. He rears his herds (*greghje*) on large areas of pasturelands (*rughjoni*) thanks to the assistance of "driving" sows which know these pasturelands and lead younger animals by ensuring their training of the zones of meal, watering and bed. He carries out the finishing period of the animals to be slaughtered (*porchi tumbatoghji*) during the autumn in the forests of chestnut-trees and oak-trees to benefit from natural food (sweet chestnuts and acorns) in great quantity grazed by the animals themselves. This particular food induces an accumulation of lipids in the meat (intramuscular fat) and in subcutaneous fat whose composition in fatty acids reflects the feeding of the animals on the environment.

Following the pigs' slaughtering, the producer carries out the processing of the carcasses into traditional products. The dry ham (*prisuttu*), the neck (*coppa*), the loin (*lonzu*), the belly (*panzetta*) and the cheek (*bulagna*) are salted and dried. Cut products like sausage (*salciccia* or *salamu*), the liver

sausage (*ficatellu*), and the fatty sausage (*salcicetta*) are refilled in various bowels. Products like the black pudding (*i sangui*), head cheese (*U casgiu di porcu*) or stuffed stomach (*ventru*) are cooked. All this represents a set of products which any rural family elaborated in time of *mannarinu*.

Actions aiming at safeguarding and recovering the Corsican pig succeeded, in 2006, with the official recognition of the Corsican pig breed by the French Ministry for Agriculture. This breed then took the name of "*Nustrale*" because of an application for a Protected Denomination of Origin (PDO) for the dried salted pieces, *prisuttu*, *coppa* and *lonzu*, in order to avoid the risks of confusion related to the homonymy. The application has been in progress at national levels since 2004, and is near to succeed.

– Mode of breeding and valorization

Extensive breeding is essentially based on the valorization of pasture-lands of "maquis" and mountainous relief. The herds remain outdoor all the year except the period of farrowing which can be done in farrowing huts. The key moment of the year of production is the autumnal finishing period with feeding containing sweet chestnuts and acorns, which leads to the slaughtering period and processing into salted products.

The reputation of the salted products elaborated by the farm producer during the slaughtering season in general allows him to market his productions towards usual and expert customers by direct selling.

– Production period

Farrowing can proceed in summer (June) and more rarely in winter which is a more unfavorable period for the survival of piglets. Many stockbreeders carry out only one farrowing per year (that of summer) and mobilize the other one (of winter) if they face some problems (fertility, prolificacy, mortality). The finishing period is autumnal and slaughter (followed by the processing) proceeds between mid-November and the end of March.

2.8 Cinta senese

Maurizio Bonanzinga, Francesca Cappè – Tuscany Region

The Cinta Senese pig breed comes from far away, in fact, we find it in some iconographic evidence of the Middle Ages, and the most famous is the wall painting by Ambrogio Lorenzetti. "Effects of Good Government" (dated 1319-1347), inside the town hall of Siena, which has been a subject of this breed as it is led by a peasant in the city. Other representations of Cinta Senese pigs appear in paintings and frescoes of the Senese school of the twelfth century in different churches in the province of Siena.

The area of origin of the breed is the Senese hill, the area included in the towns of Monteriggioni, Sovicille, Gaiole and Castelnuovo Berardenga and Casole d'Elsa, bounded by two valleys: the upper valley of the Merse in the east and the upper valley of the river Elsa west. The area was spread past the province of Siena, the Val d'Arno, the Mugello and the Tuscan Maremma. After a strong numerical reduction in the sixties and nineties it currently presents with about 138 farms throughout the region, although the province of Siena holds almost 45% of head and then Florence Grosseto and Arezzo are important areas for the breeding of this ancient race.

Picture 5 - Cinta senese Pigs

The consistency of the breed is about 1.200 sows and about 4.000 pigs. In the early 2000s in Tuscany, there were about 183 farms, over the past ten years we have seen a reduction of livestock to the current 138 (ANAS population register data source textures to July 2011) this reduction has affected small and medium types. During the same period there has been an increase in herd size medium-large, this increase has boosted the number of animals raised with respect to the year 2000. Therefore we can say that the breed is still settling, but the numbers achieved are an important basis to ensure a future, thanks to the efforts of breeders who are passionately dedicated to the recovery and relaunch of the breed. This commitment is also materialized in the formation of a consortium for the exploitation of productions called "Consortium of the protection of Cinta Senese" that formed in early 2000, has started a promotion that led to the request for protected designation of origin on pig meat Cinta senese (DOP), currently being obtained (the national transitional protection).

2.8.1 Morphological Description

Type: rugged, rustic, medium size with strong skeleton.
Coat: Skin and bristles black except for the presence of a continuous white band that completely encircles the trunk at the shoulders including the front legs.
Head: Medium development, fronto-nasal profile straight ear directed for-

ward and down to medium length.
Neck: long and harmoniously inserted in the trunk.
Shoulders: Muscular, well wrapped
Back: lumbar spine straight line
Rump: tilted
Buttock: well let down
Udder: nipples in a number not less than ten.
Testicles: well pronounced
Morphology arts: Medium length, very strong, dry joints, feet solid.
Adult weight: 300 kg males, females kg: 250.
The following table shows the biometric data of the Cinta Senese pig breed.

Tab. 2 - Biometrics data (Campodoni et al. 1998)

	Males (330 d)	Females (330 d)
Weight (kg)	154	140
wide shoulders (cm)	84,3	82,5
length of body (cm)	106,8	104
chest circumferences (cm)	122,8	121,5

Picture 6 - Cinta senese pigs grazing

2.8.2 Reproductive characteristics

The first pair is around twelve months.

Sows usually make two shares per year. The birth rate is on average 7 to 8 piglets per brood. The age of reform of sows is 6-8 years.

2.8.3 Type of farming

The types of farming are:

- wild integral system, which does not provide facilities to care for the animals and is not given any supplementary feeding to animals, not very common type;
- a system of extensive farming that provides shelter for animals and a diet consists of both commercial or farm mixture and use of forest resources and pasture.

The latter type is by far the most widespread, companies have different types of structures more or less specialized (delivery rooms, rooms for weaning piglets) and this leads to variability in production performance.

The best results are obtained when the farms are more organized, there are facilities for the breeding (admissions, delivery room), the feeding phase is planned according to the needs of the animal and the exploitation of forests is attentive and respect the natural resource.

Picture 7 - Cinta senese pig grazing in wood

2.8.4 Potentiality production

Hardy breed, bred for grazing, is able to exploit food resources of the essences of the Mediterranean forest (holm oak, turkey oak, chestnut, strawberry, etc.). Produce meat of high organoleptic quality, particularly suitable for processing into sausages.

The slaughter weight varies from 120 to 160 kg for the production of pork for the processing industry which is the dominant target.

2.8.5 Improvement

In the thirties, the breed had its own herd book and was the first Italian pig breeds to use this tool. Then the instrument of the studbook was abandoned due to a sudden drop of animals raised. In 1999 the National Association of pig farmers (ANAS) established the population registers. The endangered breeds cannot follow a program of genetic improvement, as their numbers do not allow it.

So the breeders and ANAS carried out work on consolidating the morphological characteristics of the breed and also to contain the consanguinity.

2.8.6 Technological and organoleptic characteristics

Picture 8 - Cinta senese meat

The meat of Cinta Senese pig, is very tasty, has a more intense color than the meat of improved pig breeds, with lower moisture content and a higher content of fat marbling. These characteristics are attributable to the extensive farming system. The fat cover, particularly evident in the ham, appears pinkish in color, compact and thickness.

2.8.7 Culinary use

Pigs up to about 40 kg are used for fresh use, while the pigs of 40-60 kg were used for preparation of “porchetta” (the whole animal is cooked with spices in a woodstove). The best use of heavy pigs (120-160 kg) is for the production of cold cuts including the traditional Tuscan ham, slightly salty,

Tuscan salami, the sausages, lard, bacon, "capocollo", the brawn, the "finocchiona" and the "buristo".

Fresh meat is suitable for grilled steaks and grilled ribs and the liver to the preparation of "fegatelli" in typical Tuscan recipe.

2.9 Gris du Vercors and Pintadeau de la Drôme

Françoise Robert and Murielle Laundrau - Chambre D'Agriculture de la Drôme

Poult "Grise Du Vercors" Standard

A) Majorities

Name attributed by the old breeders and used by Ouantia association: "Grey of Vercors".

Origin: region of Vercors. It results from the crossing of the black native (autochthonous) hens with those purebred "Cuccola" brought by the Italian immigrants at the beginning of the 20th century. It is linked to the traditional dish of Vercors ravioli cooked in chicken broth.

Eggs to hatch: 60 g minimum, pinkish shell.

Diameter of rings: 22 mm for cocks; 20 mm for hens.

Mass: minimum 3 kg for cocks; minimum 2 kg for hens.

B) Type and objective of the breeding

Type: Poultry farmer of Mediterranean type, rustic, liking the freedom, rather high on legs, with a proud attitude. The breed is based on two purposes, for excellent flesh and for their eggs.

Objective: To look for the preservation and the improvement of the type.

C) Standard

Cock

Body: strong and powerful, well proportioned.

Head: average.

Crete: simple, right, thicken, cut well, advancing slightly on the beak, the lobe following the shape of the nape of the neck.

Barbs: ovals, of red color, smooth, fine.

Mumps: mattering of the breed; whites, the almost round shape is looked for; however the mump lengthens with age.

Face: red, with little sleeping bags.

Eyes: lively, in orange-coloured red iris.

Beak: of colour fold clear slightly stained successful candidate.

Neck: average length.

Back: slightly tilted plentiful lancets.

Breast: rather wide reach forward.
Tail: sickles of length average and not very supplied, breakable feathers.
Thighs: very visible without stuffing.
Tarsi: lengths of color white pinkish, stripped, strong, clear nails, and marbling is tolerated.
Hen
The same characteristics as the cock by taking into account sexual differences: rather tilted simple crest; tarsi with colour tracks grey-blue tolerated; slightly opened tail but not training a range; less oblique back.

D) Color of the plumage
Variety "cuckoo"
The cock is clearer than the hen.

E) Disqualifying defects
Low subjects on legs, short shape, red or yellow feathers, red mumps, cock weighing less of 3 kg, hen weighing less of 2 kg, tail in squirrel, fledged tarsi, of yellow color, iris to clear.

Poult "Grise Du Vercors" Breeding

A) Origin
Born at the beginning of the 20th century in the region of Vercors, it arises from crossings between the local black hens and from color poultry "cuckoo" brought by the Italians coming to make some charcoal on the massif.
After the 2nd world war, "Grey of Vercors" disappeared little by little from farmyards for the benefit of the industrial poultry.
The OUANTIA association is at the origin of the revival of this poultry. It gave the objective to boost the breeding in farms. For that purpose, it appeals to the skills of the center of poultry selection of Béchanne in Ain. The association benefits from the support of the Regional Natural reserve of Vercors and from the Farmers' association of the Drôme.

B) A poultry quality farmer
Hen in the plumage blocked as the cuckoo of wood "Grey of Vercors" is a poultry of Mediterranean type in the white mumps. By its rustic character, it is particularly adapted to the country of Vercors.
It is general-purpose producing good chickens and also eggs in considerable quantity. It's sprinkled with parsley flesh has a taste of "savage".
Its products also decline in the form of capons, fattened chickens and hens to be accommodated with ravioli.
Its name "Grise du Vercors" is a registered trademark of which the association is a holder.

C) Production

The production of poultry "Grey of Vercors" is defined by specifications in compliance with a production farmer:

- Geographical area of Vercors Regional Nature Park and neighbouring communes;
- Buildings of 20 to 50 m^2 for batches of 200 to 500 chickens with a density from 8 to 10 chickens maximum/m^2;
- Purchase of one-day-old chicks;
- Ready for slaughter at an average age around 150 days;
- Large grazing ranges always with grass covering (protein source) > 6 m^2/chicken;
- Locally produced feed as far as possible and feed manufacture on the farm: cereals, high protein crop (oil crops), oilcake nuts.

Drome Guinea Poult Specifications

A) Origin, name and quality

The breeding of "Drôme Guinea Poult" is an ancestral tradition which would be more than 2 000 years old: it would have been in time of Hannibal. Guinea poults would have been introduced by this famous carthaginian general. They acclimatized well to the country of Drôme, multiplied and finally became a symbolic production of the region.

PINTADEAU DE LA DROME ("Drôme Guinea Poult").

Protected Geographical Indication (PGI).

B) Description of the animal

The "Drôme Guinea Poult" presents the following characteristics:

- The phenotype is to have a grey-bluish plumage and dark tarsi.
- The "Drôme Guinea Poult" is a young poult: the point of the breastbone is still flexible and not yet ossified. It is slaughtered at an age close to sexual maturity.

C) Method of obtaining

- Use of a strain taken from old slow growth breeds, named GD 413, reserved by the GALOR hatchery for livestock raisers that are members of the syndicate.
- Use of 400 m^2 buildings with density of 13 poults maximum/m^2.
- Food 100% vegetable, mineral and vitamin among which minimum 70 % of cereal and finish in clairette grape seeds (traditional) from the 10^{th} week by a maximum 250 kg distribution by building of 400m^2.
- The guinea poult's wings are not clipped. It is thus an animal which flies every day, what explains its particular muscle structure. It results

from particularly original practices of breeding: the external grazing range is in fact an aviary completely enclosed at more than 2 m of top; perches are installed which participate in the muscular development of the animals.

- Poultry enclosure (external grazing range) with a surface area double that of the building (800 m^2) from 6 / 8 weeks. Access to the external enclosure from 9 hours in the twilight.
- Slaughtering age between 87 and 100 days at an average live weight of 1750 g (more or less 450 g).
- Sorting of carcasses in the slaughterhouses.
- All the stages take place in the geographical area except the activity of GALOR hatchery.

D) Geographical area

23 cantons are concerned on the districts of Valence, Die and Nyons of the department of the Drôme, or on 260 municipalities.

The general observation of most of the grounds of this area of production allows it to be noticed that these warm up easily on surface and dry easily. The period of sunshine of the Drôme allows obtaining a tint of the skin and the head of "Drôme Guinea Poult". The average height of the municipalities on the zone of production is lower than 500 m except for some which benefit from a favorable exhibition. The production area and boundaries are determined in accordance with temperatures (sunshine race).

The breeding of the "Drôme Guinea Poult" of 1 day until the end is realized in this defined geographical zone. The conditioning products may be realized outside the PGI zone.

E) Link

The link with the geographical origin bases on:

- A historic reputation linked to the existence of breeding of "Drôme Guinea Poult" in the region from the end of 19th century. "Drôme Guinea Poult" is raised in small number in numerous farms of Drôme and is sent in the big cities of the south-east of France where the dish enjoys a strong prestige. The experts named by the county court of VALENCE (Drôme) en1969 concluded that the breeding of the "Drôme Guinea Poult" is implanted in Drôme since an age-old time. The sale of the "Drôme Guinea Poult" was current between the 1st and 2nd world wars and existed probably well before the 1st world war. Wholesalers' invoices dated back to the 1930s giving an idea of its importance in the market.
- A current reputation: the attribution in 1969 of the label of origin guaranteed by the county court of VALENCE confirmed this reputation

which extended over all the territory. The "Drôme Guinea Poult" took a very important place in the local gastronomy and is particularly appreciated by the well-known restaurant owners of the region.

- A know-how of the breeders: the breeders who produce of "Drôme Guinea Poult" are specialized; they have buildings adapted to this type of production.
- A favorable climate: the zone of production of "Drôme Guinea Poult" is clearly defined in the best exposed zones and on filtering grounds. The sunny climate of the Drôme is beneficial in the development of "Drôme Guinea Poult"; furthermore it helps the exit of animals in enclosure.
- A food linked to the zone: cereal and stemming which constitute the main food (70% of the part growth and finish) is very mainly produced in Drôme (corn, wheat, barley…). From the 10th week, the food contains grape seeds which brings a gustative improvement to the product and starts an old local tradition.

F) Proof of the origin

All the members of the sector are listed (hatchery, manufacturers of food, breeders, and slaughterhouses). Every batch of "Drôme Guinea Poult" is the object of documentary recordings (declaration of implementation, of departure for the slaughterhouse, of labels used for poults after slaughter, of relegated poults etc...). A control of coherence of this information assures the traceability of the product.

G) Characteristics and presentation of the product

The meat of "Drôme Guinea Poult" has a "savage" character (taste pronounced with character of game) and a firm flesh (firm texture). It presents superior organoleptic qualities.

The "Drôme Guinea Poult" is marketed in freshly whole, under several presentations:

- integers: presentation in fringe, naked or presentation in loan to be cooked, nude or on punnet under movie;
- Cut: presentation on punnet under movie or under atmosphere or presentation cuts "in bulk".

3. Analysis and evaluation of the context

3.1 Farm features

Maurizio Bonanzinga and Francesca Cappè – Tuscany Region

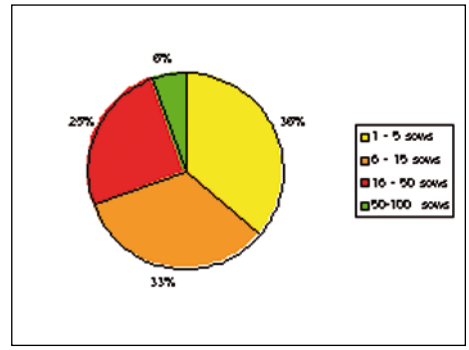
3.1.1 Presentation of the local realities

The survey, coordinated by partner Tuscany Region with the scientific support of researchers at Department of Agricultural Biotechnology - Animal Science Section – University of Florence, contributes to describe and to analyze the situation of farming of particular local livestock genetic types, belonging mostly to the swine, and of commercial destination of their products.

In particular they are examined situations of 7 local pig genetic types.

Nebrodi Black Pig

On the territory of Nebrodi Park (Sicily), a significant consistency of "*Nebrodi Black Pig"* is distributed in 111 farms with 644 sows. The rearing system of *Nebrodi Black pig* is mostly outdoors with feeding of barley and field beans and a small number of subjects is also held in free range system and fed the natural vegetation of the undergrowth (acorns, tubers, chestnuts, walnuts, etc.) which varied greatly in relation to the season. The survey was conducted on a sample of 36 pig farms. The following chart shows the distribution of sample farms by size in relation to the number of sows raised.

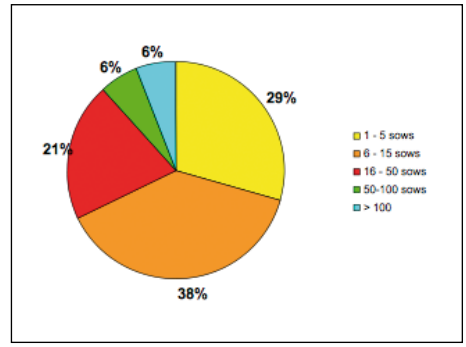


Graphic 1 –Nebrodi Black Pig Farms per class of farm size (expressed in number of sows)

Cinta Senese

The "*Cinta Senese*" pig breed is native of Tuscany and, currently, rearing is expanding both in the Region and outside after that, in the years '60-80, the breed was very close to extinction because of the strong competition of improved genotypes. To date, the official statistics report the presence, in Tuscany, of 147 farms with about 1200 sows in breeding. The farming system varies from full free range, in which the animals are not supported by struc-

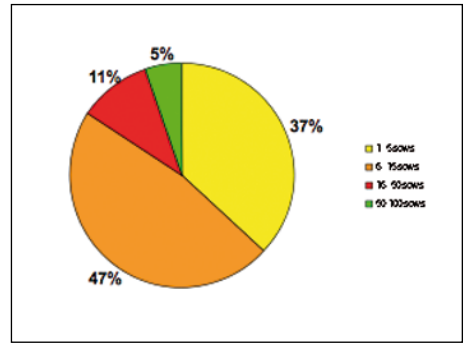
tures receiving minimal feed supplementation to natural resources, to a more rational system that uses shelters of varying complexity, especially for the reproduction phase, and feeding not far from industrial systems. However, the rearing is always outdoors on agricultural and/or forest land with different levels of intensification and animal loading. The survey covers a representative sample of farms (35). The chart 2 shows the distribution of sample farms by size in relation to the number of sows raised.



Graphic 2 – Cinta senese
Farms per class of farm size
(expressed in number of sows)

Mora Romagnola

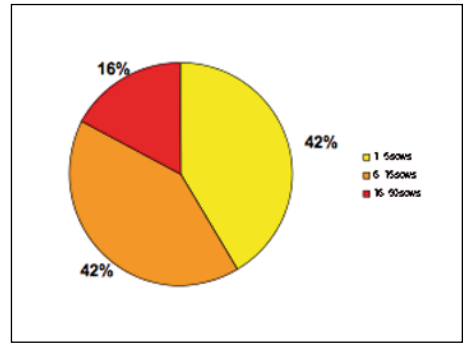
In the early nineties, only 18 heads of this breed survived in a single herd with high levels of inbreeding. Today there are 46 farms registered in the population register with approximately 450 animals (300 females and 150 males). The survey covers 23 farms almost located in province of Ravenna. The chart 3 shows the distribution of sample farms by size in relation to the number of sows raised.



Graphic 3 – Mora Romagnola
Farms per class of farm size
(expressed in number of sows)

Nero of Parma

From the '90s to now this pig has spread widely in the Parmesan and some adjacent areas due to its characteristics and meat quality. Contemporarily some breeders have formed a Consortium and developed, together with institu-

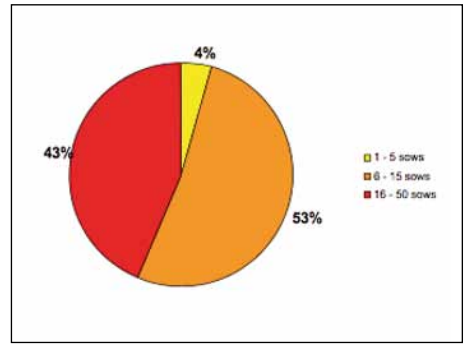


Graphic 4 – Nero di Parma
Farms per class of farm size
(expressed in number of sows)

tional bodies, a trademark to identify products derived from meat of *Nero of Parma* pork. At present, 841 females and 45 males are registered by the local Breeders Association as the hybrid pigs approved by ANAS (National Swine Breeders Association); they are reared in 38 herds, either intensive or extensive, spread in Northern Italy. The survey concerns 20 herds in the Parma Province. The chart 4 shows the distribution of sample farms by size in relation to the number of sows raised.

Nustrale

The *Nustrale Pig* breed is the local pig breed of the Corsican Island. It is present on the whole island. The livestock systems are extensive and based upon a major use of local resources like pasturelands, chestnuts and acorns. The production is seasonal so as to benefit from the chestnuts and acorns for the finishing period during autumn. The products are processed in a traditional way and often sold by the farmer himself. The producers argue that the specificity of their cured meat products comes from the local natural resources and from the specificity of the local breed (slow growth, fat deposition). The survey concerns 23 herds in Corse. The chart 5 shows the distribution of sample farms by size in relation to the number of sows raised.

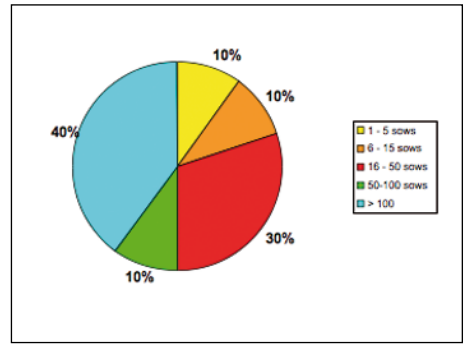


Graphic 5 – Nustrale
Farms per class of farm size
(expressed in number of sows)

Greek Pig

In the 70s-90s the *Greek Pig* faced extinction because of the strong competition of improved genotypes and crossbreeding with wild boars. Although the extinction risk is still considerable, to date the statistics report the presence of approximately 350 sows and a total population of 2,000 black pigs.

All animals generally are kept as free range, it is a very productive



Graphic 6 – Greek Pig
Farms per class of farm size
(expressed in number of sows)

livestock and the meat is of very good quality and taste. They are very tolerant in parasites and diseases and they overcome bad weather conditions very well. They live generally on free range, grazing on oak-forests. They are fed on concentrates only during the mating season. These collected data can be considered as primary data for the Greek Pig. The survey covers 10 farms located in Thessaly, C. Macedonia and West Thrace. The chart 6 shows the distribution of sample farms by size in relation to the number of sows raised.

Iberico Pig

The *Iberico Pig* is probably the most successful one, within the group of native breeds which are bred in very specific geographic areas, considering both the population and economic or commercial aspects. The project took into account the breeding of the Iberico pig in the region of Andalusia, in a type of wooded pastureland called *dehesa*. Together with the use of cork oaks in the *dehesa*, the production of Iberico pigs is, considering its close relationship with the surrounding environment, a key element in the sustainability of rangelands as we know them nowadays. In addition to other livestock species such as sheep and cattle, the extensive production of the Iberico pig is directly linked to the *dehesa* system, without which, this rustic native breed, would lose its uniqueness over other breeds more prolific and precocious, which show more appropriated skills in other environments such as intensive management systems.

The production of acorns in the *dehesa* is the main limiting factor in the production of pigs in montanera systems. Because of this fact, in recent years it has become necessary to produce Iberico pigs based on industrial feed, separated from the classification of *montanera*. Regarding to the distribution of extensive Iberico pig breeding units in the *dehesa*, considering a total amount of 5.500 in Andalucia, in the eastern region of Los Pedroches there are 1.600 type extensive farms, with 80 animals per holding.

3.1.2 Elements of comparison among different production realities

The examination of the surveys on the various realities allows some reflections to highlight common and differential aspects.

It should be considered that the statistics refer to a sample, the most representative, of the rearing system of each breed in a well-defined territory which usually corresponds to the area of origin and/or of maximum spreading. Almost all the considered herds make the complete cycle and only for

the *Mora Romagnola* some farms were surveyed (17%) in which only fattening is present.

On the other hand, in the realities of local breeds, this latter type of rearing system is rather rare and temporary, as there is no need to specialize in the farming of these breeds.

The summary of the data in table 3 below shows a remarkable homogeneity among the realities analyzed with regard to farm size, measured by the average number of sows. They are always realities based on a limited number of breeding pigs, with 30-40% of those managing less than 5 sows. One exception is the reality of the "*Nustrale*" pig, having a greater presence of medium-sized farms (6-50 sows). It is recorded, in the case of the *Cinta Senese* in Tuscany and *Mora Romagnola* in the province of Ravenna, the presence of large farms (at least for the local pig breeds), which indicates a tendency to move towards economies of scale.

Also the reality of the *Greek Pig* production appears oriented towards medium-sized herds, with almost half of the farms that keep more than 100 sows.

The situation of the Iberico pig has to be considered separately because the number of animals raised and the number of sows and boars is very high and is not comparable with that of other local breeds. In fact, the number of pig heads reared in extensive systems in the area of Los Pedroches, is over 200.000 while the number of extensive farms is 4.370.

For this reason, in table 3, the classification of farms of Iberico pig, according to the classes of sows, is not reported.

As a comparison with the actual production of local pig breeds, it can be reported what emerges from the report on the *Plana de Utiel-Requena*. In this region of Spain, a purely industrial-type pig production is implementing with a high specialisation of the various productive phases so that on 114 farms, 92 are only for fattening and 12 only for multiplication, breeding or nursery. Only 10 farms make the complete cycle. In this situation, the herd size, measured as number of sows, refers to classes that are completely different from those used for the local pig system because only 20% of the companies under investigation raises fewer than 50 sows (representing only 1% of the total sows) and another 20% (57% of total sows) is in class between 1500-2500 sows.

Tab. 3 - Distribution (%) of herds in dimensional classes on the basis of number of sows. In parenthesis the incidence of sows on the total.

	Herd size (n. of sows)			
	1-5	6-15	16-50	> 50
Nebrodi Black Pig	36	33	25	6
Cinta Senese	29(6)	38(17)	21(23)	12(54)
Mora Romagnola	37(7)	47(40)	11(23)	5(30)
Nero of Parma	42(13)	42(45)	16(42)	
Nustrale	4 (1)	53(33)	43(66)	
Greek Pig	10	10	30	50

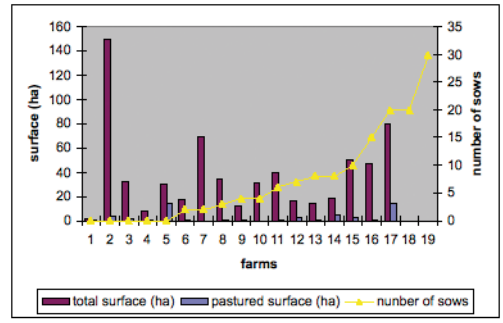
3.1.3 Types of farming

In most of the realities under investigation there is a close link between farm and herd in the sense that breeding takes place within the agricultural activity and, for this type of pig, cases of "landless" herds are rare. This is due to the fact that breeding is always "outdoors" with varying degrees of free ranging and of use of natural resources to supplement animal feed. However, the allocation of farmland to the rearing of pigs is generally limited and the areas of pasture (both herbaceous and forestry) are often undersized.

Assessing the impact of grazing on the farmland area and its relation with the consistency of sows it can be proposed an estimation of the degree of intensification of the various types of rearing that puts, in ascending order, the following ranking: *Nero of Parma*, *Mora Romagnola*, *Cinta Senese*, *Greek Pig*, *Nebrodi Black Pig*, *Nustrale, Iberico*. Detailed examination is as follows:

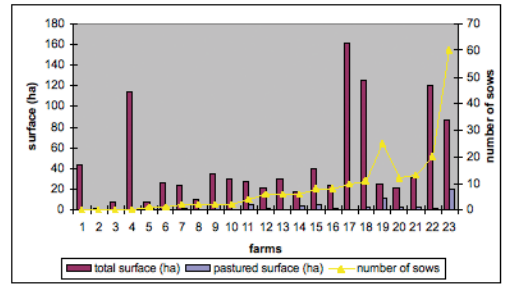
Nero of Parma - Farms have relatively small area (only 3 on 20 over 50 ha) and the area under pasture is present in very small proportion and only in 7 farms (graphic 7). There is no relationship between the number of sows and area of farm and/or pasture so that the two farms that have the largest stock of animals are landless. The picture fits with the characteristics of this genetic type that is not considered a recovered ancient local pig (Nera Parmi-

giana) but a pig of recent constitution on the basis of a synthetic cross (Hybrid *Nero of Parma*) and that tends to be reared in intensive conditions, even for the agricultural type on the territory of relevance.



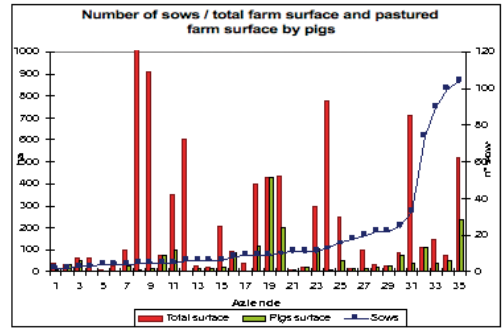
Graphic 7 – Nero of Parma
Total surface, pastured surface and number of sows

Mora Romagnola - Also in this reality, farms have modest extensions (only 4 out of 23 exceed 50 ha) and again the pasture surface is small (only in two cases more than 10 ha) and never in proportion to the number of sows (graphic 8). It is evident that this reality, as the previous one, does not use the pasture for the pigs but rather more or less wide areas for the outdoor rearing. This may be due to the special feature of the land and the lack of suitable woodland in the territory of reference. The trend towards an intensive dimension, typical of the mentality of breeders in the area, is also documented by the presence in the test sample of farms engaged only in fattening (4 out of 23).



Graphic 8 – Mora Romagnola
Total surface, pastured surface and number of sows

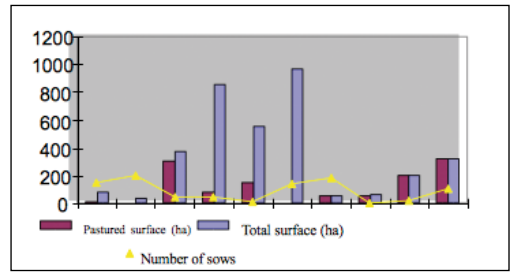
Cinta Senese - Farms of reference have extension generally high (14 in 35 over 100 ha and 8 over 400 ha). Also the area used for grazing pig is quite important and two farms even reserve the entire farmland in this activity (graphic 9). The widespread presence of oak and chestnut trees allows use of pasture for food as well as for accommodation of animals outdoors. Also



Graphic 9 – Cinta senese – Number of sows/total farm surface and pastured farm surface.

this reality has little relation between consistency of sows and width of available pasture to indicate a strong variability of intensification of rearing. This definitely has an impact on the share of utilization of natural reserves in relation to requirements by the pigs and in particular on the sustainability of grazing on the land.

Greek Pig - Companies have a rather wide area (only 10% is less than 50 ha and 30% exceeds 500 ha). The area devoted to pig pasture is sometimes restricted even though in 50% of companies it seems to affect the whole available farm surface. This happens especially in small to medium farms. The link between the number of sows and farm and / or pasture surface is still labile as demonstrated by the wide variability of the carrying value of sows per hectare (0.02 to 6.45). The 70-80% of farms resort to the use of wood and natural pastures throughout all the year and any farm noted no serious problems with soil erosion and the renewal of vegetation.



Graphic 10 – Greek Pig
Number of sows/total farm surface and pastured farm surface.

Nebrodi Black Pig - In this reality only 50% of farms have owned land. The other farms use varying extents of rented land. The territory is mostly hilly and mountainous (above 90%) and the dimension of farms is small to medium even if the 28% is between 50 and 165 ha. The 91.6% has forest areas in its territory and 70% has also areas of pasture with oak, cork oak, holm oak, chestnut and beech and typical Mediterranean scrub. Of the 26 farms that use the land, 19% has an extension greater than 50 ha. The pigs are grazing throughout the year in 55% of cases or only in autumn-winter or spring in the remaining cases. However, the forest resources are widely employed for the supplementary feeding of animals.

Nustrale - In Corsica, we don't have precise data about the area of pastured land since animal are often free to pasture in lands that are not property of the breeder himself (forest area, commons etc.). As a consequence only a part of the breeders can give precise information about the area of pastured lands. It seems therefore a system of high intensification where the area available for grazing may actually exceed the farm's own land and where

the feeding is often provided only as a rescue in times of scarce presence of natural resources. With the available data, therefore, it becomes difficult to establish a ratio between animal load and pasture area but it is likely that the system is able to regulate itself in large extensions still available and free.

Iberico Pig - Most of the pig farming in Los Pedroches area are extensive (97%) and the 97% of pigs are reared according to this system. Intensive pig farming has a very little importance in the area, if it is compared to extensive livestock farming.

Traditionally, the management of the Iberico pig presents long cycles of production, with a seasonal use of all available resources: acorns in autumn-winter, pastures during the spring and stubbles in summer- fall. Therefore, it was very important to schedule the farrowing sows in order to provide food enough to the animals in its early stages. Generally, in traditional farms all animal stages were developed, from breeding and reproduction until the fattening. In this last phase, during the montanera, the herds of 80-100 animals guided by the swineherd roamed the farms searching for acorns during about 100 days (November-mid February). In this period the number of animals/ha is very low: 0.5 pigs/ha on average.

3.1.4 Productive parameters

The production of local breeds shows a wide variability of weight and age of slaughter. This variability is present within each farm (for which the survey declares the most usual weight class and age), among farms within the same breed, due to the productive and managerial choices that each farmer considers more suitable, and among the local breeds in response to the intrinsic capacity of growth and maturation as well as size.

It seems highlighting the comparison with the reality of the intensive pig production of *Plana de Utiel-Requena* which has a production target well defined (light pig), uses improved pigs (standard) and must respond to the economic logic of market that requires well calibrated and standardized growth rates.

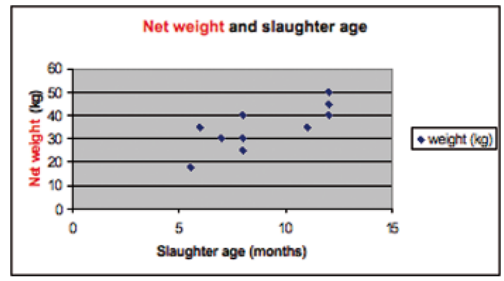
Therefore, age and slaughter weight fluctuate slightly and the more frequent production is concentrated on a range of weight of only 5 kg.

The *Greek Pig* differs from all others for the slaughter weights really low and away from those typical of the Mediterranean production that relies pig sausage processing.

In fact, the weights recorded were related to the carcass but indicate low

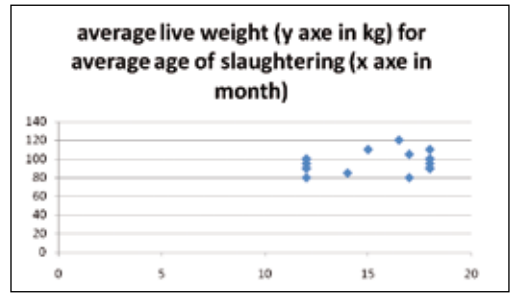
slaughter weight, certainly lower than that of *Nebrodi Black Pig* and *Nustrale*, with whom there seems to show greater morphological resemblance.

On the other hand the age of sacrifice, is never greater than one year and seldom less than 8 months, which indicates the choice not to seek particular maturity of the meats.



Graphic 11 – Greek Pig
Net weights and slaughter age

Nebrodi Black Pig and *Nustrale Pig* have good reciprocal resemblance as the weight class to which they are more commonly slaughtered (80-100 kg) that is considerably lower than that of the other breeds, excluding the *Greek Pig*.

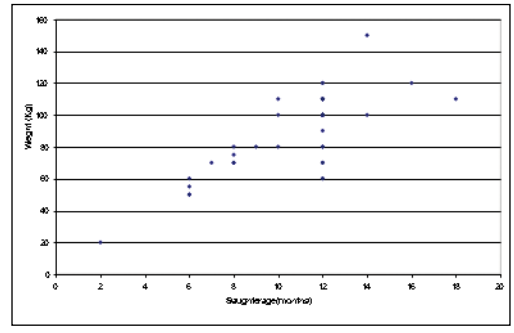


Graphic 12 – Nustrale – Weight and slaughter age

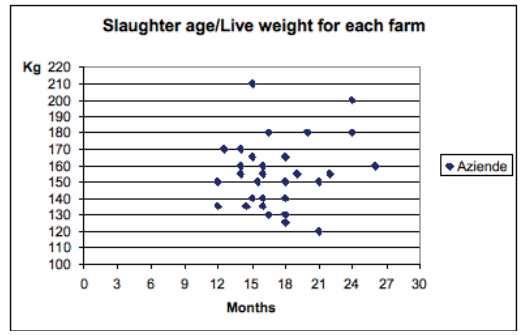
This slaughter weight is due to the small size of these breeds and to farming system that often are free ranging, especially for the *Nustrale* (graphic 12) that, in fact, requires on average 6 months longer to reach the target weight and that, is unique among the local breeds, which have a seasonal slaughter (autumn-winter).

Nebrodi Black Pig also has a very low slaughter weight (50 kg), probably for the production of roast pork or fresh meat (graphic 13).

Cinta Senese and *Mora Romagnola* are slaughtered preferably at weight of 150 - 170 kg, which corresponds to the category of typical Italian heavy pigs obtained with the improved breeds.



Graphic 13 – Nebrodi Black Pig
Weight and slaughter age



Graphic 14 – Cinta senese
Live Weight and slaughter age for each farm

This weight is also easily accessible for these local breeds, being of good size. For Mora Romagna, however, fluctuations in weight and / or age are very small, to testimony a rearing system fairly standardized and little intensified, while for the *Cinta Senese* they are much wider. In the actual production of this breed, in fact, slaughter weight is variable but age seems to differ even more, so that the same weight of 150-160 kg is reached both with yearlings and with pigs aging two years old (graphic 14).

This heterogeneity is attributable to the farming system and to different nutritive planes and has important consequences on the variability of the characteristics of the finished product, on its quality and its commercial destination.

The *Nero of Parma* shows, also in this aspect, its specificity in respect to the other local breeds. Its target weight of 180 kg at 12 months (or 200 kg in 14 months) confirms the excellent performance of its growth due in part to its origin as synthesised crossbreed with the contribution of improved breeds.

Even for this production, however, a strong variability in the type of pig is present as a function of both weight and age of slaughter, index of well-differentiated productive and commercial systems.

The situation of local breeds reared in their typical reality, is therefore in relation to production parameters: live weight and slaughter age as summarized in the following table.

Tab. 4 - Age and weight at slaughter

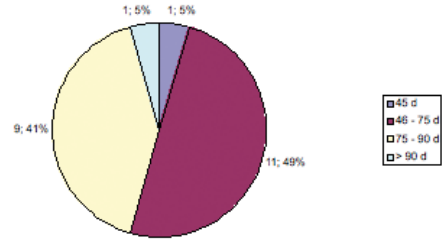
	Age range (mo.)	Weight range (kg)	Weight class of max. freq. (age range)
Nebrodi Black Pig	6 – 18	50 – 150	80 – 100 kg (6 – 12 mo.) 10 cases
Cinta Senese	12 – 26	120 – 210	150 – 160 kg (12 – 26 mo.) 12 cases
Mora Romagnola	14 – 18	150 – 180	160 – 170 kg (14 – 18 mo.) 14 cases
Nero of Parma	12 – 24	120 – 240	180 – 200 kg (12 – 21 mo.) 12 cases
Nustrale	12 – 18	80 – 120	80 – 100 kg (12 – 18 mo.) 9 cases
Greek Pig	6 – 12	20 – 50*	30 – 40* kg (7 – 12 mo.) 6 cases
Iberico	12-24	140-160	
Pig of *Plana de Utiel-Requena*	5.5 – 7	100 – 115	105 – 110 kg (6 – 7 mo.) 6 cases

* As carcass weight

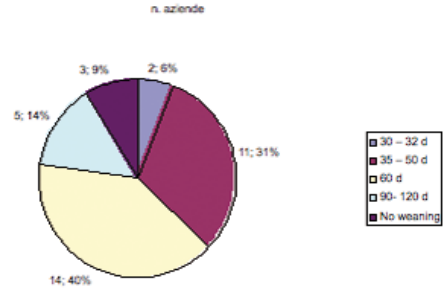
3.1.5 Reproductive activity

The reproduction is, of course, an essential activity in all livestock system and can be one of the critical elements for the economic viability of farming. The local pig breeds considered in the survey, because of the intrinsic features and the management arrangements, are notoriously less prolific than the improved breeds. It is clear that the lower fertility of the local breeds in their breeding area compared to that of improved breeds, represented by the industrial reality of the *Plana de Utiel-Requena*.

It is also evident that sows of local breeds are subjected to less intensive breeding (births / year) due less to decreased fertility as a different modality of management by the farmer which, in particular, delays the time of litter weaning, inevitably lengthening the delivering interval. It is noticeable that while in herds in the *Plana de Utiel-Requena* the suckling period lasts up to 28 days, for *Cinta Senese* it is reported an average of 58 days (maximum up to 100-120d) (graphic 15), for *Nebrodi Black Pig* most frequent value is 60 d, with peaks ranging up to 3-4 months (graphic 16).

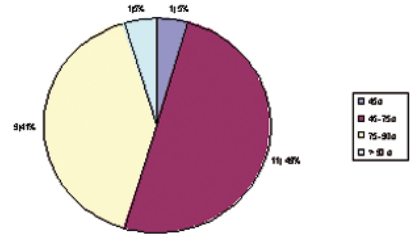


Graphic 15 - Cinta Senese
Weaning age (d) in the farms
(number and percentage)

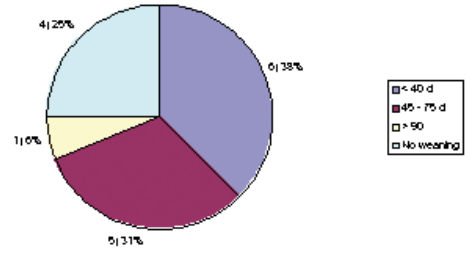


Graphic 16 - Nebrodi Black Pig
Weaning age (d) in the farms
(number and percentage)

Graphs 17, 18 and 19 show the distribution of farms by age of weaning of local breeds: Nustrale, Nero of Parma and Greek Pig.

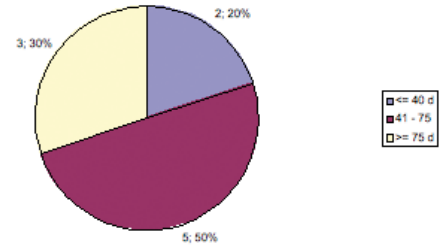


Graphic 17 - Nustrale
Weaning age (d) in the farms
(number and percentage)



Graphic 18 - Nero of Parma - Weaning age (d) in the farms
(number and percentage)

Clearly, this system of management of local breeds strongly depresses the productivity of piglets weaned/sows/year bringing it to values halved compared to those typical in the intensive pig production.



Graphic 19 - Greek Pig - Weaning age (d) in the farms (number and percentage)

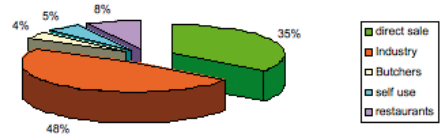
The survey was carried out; however, it shows a slight contradictory behaviour of farmers regarding this aspect. Some farmers are not looking for intensification of reproductive activity also for the difficulty of placing on the market the finished product, being a niche product, while others see it as a limit for these breeds to be somewhat outdated. The latter ones are more "industrialized" farmers, which operate with a greater awareness in the management of merchant outlets and in the company profitability and implement appropriate techniques to improve reproductive performance. Thus, the survey highlights that some herds of *Cinta Senese* and *Nebrodi Black Pig* wean at earlier (28-35 days) and apply to parturition and suckling phases those evolved technologies that are typical of intensive livestock farming (births indoors in individual cages with anti-crushing systems and appropriate neonatal care). The summary of the reproductive performance of pig breeds covered by the survey is presented in the following table.

Tab. 5 - Reproductive performance

	Litter size		Births/sow/ year	Weaned/sow/ year
	Born alive	At weaning		
Nebrodi Black Pig	8.97	7.54		
Cinta Senese	6.82	6.16	1.59	9.8
Mora Romagnola	8.31	6.52	1.75	11.4
Nero of Parma	7.40	5.41	1.35	7.3
Nustrale	6.87			
Greek Pig	8.1	5.3	2	10.6
Pig of *Plana de Utiel-Requena*	10.90	8.45	2.42	20.5

3.1.6 Destination of products

The situation of commercial products of the 7 local pig breeds is extremely variable and it is hard to give an overview of the various trade flows.



Graphic 20 – Cinta senese
Destination of the product

Even if it is niche productions, share of auto-consumption is very low, reaching the peak in *Cinta Senese* (5%) (Graphic 20).

Direct selling is possibly the most widespread method of marketing, particularly in the realities of *Greek Pig* (58%) (Graphic 21), of *Nustrale Pig*, where it reaches more than 90%, and of *Nebrodi Black Pig*, where it is the only commercial channel.

For the other breeds, however, the direct selling is a good part of the market (43% in the *Cinta Senese*, 37% in *Nero of Parma*, 23% in Mora Romagna) and often occurs with direct sales to private individuals or companies to join others in the market which holidays places like restaurants, butcheries and shops. For the commercial realities of these last three breeds, however, is also an on-going relationship with the processing industry that is being developed especially for Mora Romagna and *Cinta Senese* which has also begun to be directed by a few large Companies also to the GDO which is capable of enhancing the product, ensuring wide distribution anyway.

Graphic 21 – Greek Pig
Destination of the product

The light pigs produced in the *Plana de Utiel-Requena*, however, have a far less nuanced in commercial destination by following the normal channels of industrial production which are the processing industry and butchers.

The situation of the Iberico pig has to be considered separately because almost all farms are geared towards the sale of fresh meat to the meat processing industry for the production of the "Jamon Iberico".

The sector of the Iberian pig is, without any doubt, a reference of quality product in the perception of the final consumers.

The term "Iberico" already involves a positive differentiation against other products of the white pig. In addition, within the "Iberico" there are sev-

eral factors which characterize the final quality of these products: the genetics, the age and weight in the sacrifice, the castration, the physical exercise made by the animal, the process of elaboration and cured and, particularly, the feeding.

The quality of feeding is mainly based on the feeding in the final phase of fattening, according to the Royal Decree 1469/2007, of 2nd of November, which regulates the norm of quality of Iberian pig products.

The purpose of the rule is to establish the quality characteristics to be met by products from the cutting of the channel that is marketed fresh (meat, which is newly incorporated by that regulation) as well as other traditional processed products such as cured ham.

These characteristics are established according to breed and feeding, in relation with the breed of the animal that constitutes the raw material, they establish two designations:

- Iberian pure: coming from pure Iberian mother and father, registered in the genealogical book.
- Iberian crossbred: coming from pure Iberian father or Iberian mother.

In relation with the feeding provided to the animal in the period immediately previous to the sacrifice, four designations settle down:

- Acorn or finished in montanera.
- Recebo or finished in recebo.
- Field fattening(new category introduced by the regulation).
- Fattening.

A regulation is also included regarding the advantage of the dehesa ecosystem of traditional production of the Iberian pig for the categories of "acorn" and "recebo".

Municipalities in which this ecosystem exists are identified and a maximum livestock production per hectare is defined in order to guarantee its conservation and sustainability.

This norm will contribute to preserve the quality and competitiveness of these traditional products, including the slices of the ones, in a transparent market in which the rights of the consumer, as well as those of the sector, are guaranteed.

To achieve it: control mechanisms are specified and applied by means of inspection and certifications made by independent organisms of control (organizations of inspection and organizations of certification).

The control in the field is reinforced and racial and feeding criteria are set and controlled. These criteria are guaranteed by means of control and traceability procedures in all the chain of production.

The destination of the product in different races studied is presented in the following table.

Tab. 6 - Destination of the product (%)

	Self-Use	*Direct sale /restaurant*	*Butchers /traders*	*Industry*
Nebrodi Black Pig		100		
Cinta Senese	5	43	22	30
Mora Romagnola		23	20	57
Nero of Parma		37	58	5
Nustrale	1	90	9	
Iberico				100
Greek Pig		58	32	10
Pig of the Plana de Utiel-Requena			18	82

3.2 Territorial features

François Casabianca - INRA

Summary

Within the Mediterranean QUBIC project centered on innovations developing biodiversity, we approach the points of view of the breeders in extensive systems based on local breeds, on their insertion in the dynamics of territorial development. A questionnaire including 4 parts and 12 questions were managed towards 123 farmers carrying on their activities of pig production based upon the local breeds, in the 5 areas interested by the project:

Italy (Tuscany, Sicily and Emilia-Romagna), with four pig breeds: *Cinta Senese*, *Nero Siciliano*, *Mora Romagnola* and *Nero of Parma*.

Greece (Thessaly) with the *Greek* black pig,

France (Corsica) with the *Nustrale* pig breed.

In addition, the same questionnaire has been used in two other areas of the project:

Spain (Valencia area) without any local pig breed,

Continental France (Drôme) with two local poultry breeds (*Grise du Vercors* poultry and *Pintadeau de la Drôme* guinea fowl).

Data collected relates to:

(i) environmental problems,
(ii) visions of the territory and local insertion of activities,
(iii) local breed seen as a factor of anchorage of the activities,
(iv) Professional identity of the stockbreeder of local breeds.

We carried out an analysis centered on the link between breeds and territory, in order to identify possible points of blocking and levers in the projects of development of these breeds.

According to the pig production, we identify common features but also marked differences:

- Established systems (*Cinta Senese* in Tuscany) where a lot of newcomers show some lack of technical culture.
- Stabilizing systems (*Nustrale* in Corsica, *Nero Siciliano* in Sicily) with deep anchorage of activities but weak professional organization.
- Emerging systems (*Greek* in Thessaly, *Nero of Parma* or *Mora Romagnola* in Emilia-Romagna) not yet insured in their territorial insertion.
- The case of poultries has been interesting to classify:
  - *Grise du Vercors* poultry is clearly classified among the emerging systems.
  - *Pintadeau de la Drôme* guinea fowl is classified among the established systems.

The situation of Valencia (Spain) has shown a contrasted situation with a lot of problems due to the environmental issues of an intensive breeding system. Some considerations on the re-introduction of the local pig breed (*Chato Murciano*) are proposed.

Such comparative study allows supplying useful elements for future exchanges at Mediterranean level.

3.2.1 Introduction

Give the floor to the breeders' voice, such intention is not so frequent in our scientific communities (Flamant *et al*., 1994). A large number of studies have been conducted on the objective quality of breeds (Chiofalo, 2010) or on the influence of the way they are reared (Coutron-Gambotti *et al*. 1998; Pugliese et al. 2009). What about the breeders' point of view on some main questions we, as scientists or developers, are studying? Is it relevant to conceive a development pathway without this input?

Is biodiversity good for the future of the production units as Iberian pig is demonstrating (Lopez-Bote, 1998)? Is the local breed an asset at territo-

rial level? How breeders are considering their activity within the territorial stakes? Is the local breed a way to enforce a new professional identity?

A questionnaire including 5 parts and 44 questions (see Annex 1) was managed towards 123 farmers carrying on their activities in the 5 areas interested by the project and using local pig breeds: Italy (Tuscany, Sicily and Emilia-Romagna), Greece (Thessaly) and France (Corsica).

In each area, there is one local breed, except in Emilia-Romagna where there are two.

So, local pig breeds considered in our study are:

- For Italy, in Tuscany the *Cinta senese* breed, in Sicily the *Nero Siciliano* breed, in Emilia-Romagna both the *Mora Romagnola* breed and the *Nero of Parma* breed.
- For Greece, in Thessaly, the *Greek* breed.
- For France, in Corsica, the *Nustrale* breed.

We decided to focus only on some of this data (12 questions) in order to present a more accurate analysis on the specific linkage between local breed and territory according to the breeders' point of view.

Other areas of the project showed other frameworks:

- French region of Drôme is not dedicated to a local pig breed, having strong tradition in poultry production. In this area, two local breeds are bred: The *Grise du Vercors* poultry and the *Pintadeau de la Drôme* which is a guinea fowl.
- Spanish region of Valencia where processors of pork meat (benefiting of a Protected Geographical Indication PGI) are not using a local pig breed.

So, these two areas show other orientations very far from the previous ones. We decided to use the data collected in these two additional areas after the five where local pig breeds are bred. Thus, our analysis is mainly using the answers from the 5 local pig breeds; producing categories for better understand the territorial features of the local pig breeds. Further analysis is including the two additional areas in comparison with the initial ones and checking the relevance of our categories.

Moreover, every area was supposed to provide a synthesis of the main issues from the enquiry (see Annex 2) putting in evidence specific territorial features. A SWOT analysis was done in order to have an overview of the local situation.

3.2.2 Material and Methods

Breeders sampling

As reported in table 7, the sample of breeders interviewed is quite important with 123 farmers in 5 of the areas of the project.

So these 6 local pig breeds are comparable as census of animals is quite reduced and breeds are still located in the native area.

In the additional areas, breeders have been questioned as follows:

- French Drôme: 13 breeders.
- Spanish Valencia: 8 producers.

We use the collected data in these two regions as an additional analysis in the final discussion of the results.

Tab. 7 - Sample of breeders according to the country, the region and the breed

Country	**Italy**	**Italy**	**Italy**	**Greece**	**France**
Region	Tuscany	Sicily	Emilia-Romagna	Thessaly	Corsica
Name of the breed	Cinta Senese	Nero Siciliano	Mora Romagnola and Nero of Parma	Greek	Nustrale
Number of interviewed breeders	35	36	19	10	23

Data recollected

A questionnaire including 5 parts and 44 questions was managed towards the 123 farmers.

The same questionnaire was also managed into the other areas. At the contrary of the other actions of the project, our questionnaire comprised a lot of open questions and only a few closed questions. So, we tried to collect qualitative data that is crucial to understand a territorial insertion of the breeders. Such qualitative data is more complex to manage during the data analysis.

The questionnaire was oriented on the following fields:

- Part 1: Environmental problems and the way the farmers face them. With a total of 8 questions, only 3 questions were presented.
- Part 2: Appropriateness of the breed and vision of the territory and the insertion of breeding activities in the local dynamics.

A total of 9 questions and 2 questions presented.

- Part 3: Organizational aspects. The local breed seen as a factor of anchorage of the activities.
  On 10 questions, 2 questions are presented.
- Part 4: The professional identity of the stockbreeder of local breed in the evolutions of the sector.
  Among 10 questions, 5 questions are presented.
- Part 5: Valorization and market connection.
  Among 5 questions, 2 questions are presented.
  So, among the 44 questions, only 12 are presented.

We choose the questions where some contrasts between the various areas are visible. The other part of the questionnaire was interesting only as a context of the producer and not really for being processed into the analysis.

In order to facilitate the analysis, we re-arranged the questions into 4 fields crossing some parts of the questionnaire. We indicate the number of the question used for the analysis of the field (see Annex 1).

For closed questions (yes / no), results are expressed as % of YES. For open questions, the main answer is mentioned.

3.2.3 Results

According to answers, we carried out an analysis field by field. Such analysis is centered on the link between the breeds and their territory within these various located systems, in order to identify possible points of blocking and levers in the projects of territorial development of these breeds.

1 – Environmental problems

In the first part of our inquiry, we are dealing with environmental problems and the way the farmers face them. In particular, questions of pollution and sanitary risks of the animals in free range.

Q 1 – Are you facing some environmental problems in your livestock farming? Which ones? (For example water pollution, soil erosion, plants and trees destruction, animal divagation).

Q 5 – What kinds of disease are present?

Q 8 – Due to extensive livestock system, are you obliged to consider wild animal diseases in your prevention plan?

Tab. 8 - Answers from the breeders about environmental problems

Answers from the breeders	Cinta Senese	Nero Siciliano	Mora Romagnola Nero of Parma	Greek	Nustrale
Q 1	60	0	58	0	56
Q 5	Pneumony Parasites	Parasites	None	None	Aujeszky
Q 8	18	0	5	10	0

The grazing in forest seems to be commonly used and almost a great part of the pigs' life is outdoors (see table 8). Nevertheless, a majority of the breeders are declaring no environmental problems, but we notice great differences between the various situations.

Parasites are clearly the main kind of disease as mentioned in the answers.

Soil erosion and some trees destruction are also evoked but breeders are complaining about the obligation to put nose rings in order to avoid such problems.

And very few breeders have consciousness of the questions of contamination from the wild animals (especially from the wild boars).

As major issue, we can see that a great part of breeders are not aware of environmental problems. This must be addressed during the presentation of the results to the local breeders as the environmental issue seems to be underestimated.

2 – *Insertion within the territory*

In the second part of our enquiry, we are looking for the visions of the territory expressed by the breeders and the insertion of their activities in the local dynamics.

In particular, we try to approach organizational aspects of the breeds' management and of the product valorization in the territory and the factors of specificity of the extensive breeding in the offer of regional products.

Q 40 – Do you think breed, goodwill, and territory linkages represent added value for you?
Q 41 – Is the breed well known in the territory and do you use the image of the breed and/or of the territory to sell your products?

Tab. 9 - Answers from the breeders about their insertion within the territory

Answers from the breeders	**Cinta Senese**	**Nero Siciliano**	**Mora Romagnola Nero of Parma**	**Greek**	**Nustrale**
Q 40	100	100	95	60	100
Q 41	95	100	74	70	74

This second part of enquiry is giving less contrast between the various situations (see Table 9).

In general, the local breed is conferring good insertion to the breeder and positive image for its activity.

In addition, some lack of recognition at social level is mentioned by breeders (except in Sicily) and the local breed is not sufficient to insure a good position in the local society.

In Corsica, breeders are also mentioning risks of confusion at market levels, as products deriving from the local breed have no special identification at the moment. The application for a PDO should give some assurance for using the reputation of Corsican pork meat only for products corresponding to the local traditions, and using the local Nustrale pig breed.

As main issue, we can assume that the image of the breed is adding value in an effective way. Pictures of the animal from the local breed are frequently used as an identity marker, and also on the commercial brand.

The breeders are using the image of their breed for commercial use.

3 – The local breed as an asset

This third part of the enquiry deals with the local breed seen as a factor of anchorage of the activities.

The adequacy of the animals to the systems of breeding and the collective management of the breed are the principal points as well as the question of the possible crossbreeding with other selected races.

Q 9 - Do you consider the local breed as fully adapted to the local farming system?
Q 17 - Have you effective practices of crossbreeding?
Q 30 - Do you feel that the local breed is insuring you a deep anchorage in the territory?
Q 39 - Do you establish a link between the "good breeder" and the "beautiful animal"?

Tab. 10 - Answers from the breeders about the local breed and the crossbreeding

Answers from the breeders	Cinta Senese	Nero Siciliano	Mora Romagnola and Nero of Parma	Greek	Nustrale
Q 30	100	95	74	60	83
Q 9	100	95	90	100	74
Q 39	90	10	79	100	17
Q 17	36	26	55	50	21
Main issues	Crossbreeding as ancient practice	Rejection of "good breeder"	Crossbreeding = "Borghigiano"	Crossbreeding considered as normal	Rejection of "good breeder"

In this third part, we can see (Table 10) a real consensus for the questions 9 and 30 as quite all the breeders are considering deep anchorage provided by the local breed and also a good adaptation of their animals to the local farming system.

Such a situation was expected as the local breed is in general less productive than the selected one. So the breeder must have some interest in breeding these animals. Full adaptation of their animals to the local farming system makes sense for the breeders and they agree on the relative superiority of the local breed.

For the questions 17 and 39, we notice great contrasts among the various situations.

For *Cinta senese* and *Mora Romagnola / Nero of Parma*, the crossbreeding is an ancient practice and breeders are considering it without any problem. A special name is given for crossbred animals in Emilia-Romagna.

In Greece, as recovering of black pigs is still in progress, crossbred animals are quite the normal situation.

In the other areas, such as Sicily and Corsica, this practice is disappearing and moving to pure local breeds as a main stream.

For Corsican and Sicilian breeders, the rejection of the notion of "good breeder" is strong. They consider that local breed animals can be diverse according to the breeders' preferences. They assume an internal diversity as breed collective identity. This is a very important point to be addressed for the collective management of the breed.

A main issue, local breed insures deep anchorage to the territory and seems to be well adapted.

Crossbreeding seems to be disappearing in almost all the areas.

4 – The local breed as a professional identity basis

In the last part of interviews, we emphasize the professional identity of the stockbreeder of local breed in the evolutions of the sector. Information is in particular collected on the anteriority of the breeding activity, their vision of their trend compared with other types of breeding, as well as the pride to be a producer of local breed.

Q 31 – Is the local breed a familial heritage transmitted by the previous generations (not something completely new)?
Q 32 – Are you claiming to be considered as a distinguished activity compared to exogenous breed farmers?
Q 33 – Are you proud to be a local breed promoter?

Professional identity of the breeders seems to be a crucial point for their territorial insertion. As a majority of breeders are claiming to be differentiated from the exogenous breed farmers, the national situation must be taken into consideration: in Italy, the local pig breeds are giving a strong identity to the farmers but with poor recognition.

Tab. 11 - Answers from the breeders on the professional identity

Answers from the breeders	**Cinta Senese**	**Nero Siciliano**	**Mora Romagnola Nero of Parma**	**Greek**	**Nustrale**
Q 32	100	100	84	30	30
Q 31	14	100	10	40	87
Q 33	100	95	68	70	74

We notice a lot of newcomers, in particular *Cinta Senese* (attractiveness due to the PDO application and the huge communication around the breed), *Mora Romagnola* and *Nero of Parma* (quite new as an official breed), and quite important in *Greece* (as expected in a recovery process).

At the contrary, Corsica and Sicily seems to have mainly familial heritage. The professional basis of the local breed appears more stable in both islands than in the other areas. But at the same time, this community-based tradition induces a lack of collective action and real difficulties to involve breeders into organizational devices.

Almost all the breeders are associating pride and local breed activity. This point is very important to be underlined because the future of the local breeds could be facilitated by such a feeling. In the presentation of the project re-

sults for the local authorities, we should emphasize the attractiveness of the local breeds in terms of professional identity.

As a main issue, major part of breeders are proud, but are also claiming to be better recognized.

3.2.4 Results from the additional areas

The French Drôme poultry

The two productions (*Grise du Vercors* poultry and *Pintadeau de la Drôme* guinea fowl) must be distinguished.

The *Grise du Vercors* poultry shows a classical situation of recovery with a lot of difficulties to manage the production (lack of technical knowledge) and a weak anchorage to the territory. The location of the farms in the Regional Natural Park is providing a lot of surfaces in forests and pasturelands. This explains that the problem of predators is a real preoccupation for the farmers. Also the parasitism for outdoors animals can occur.

A good adaptation of the local breed is mentioned: hardiness, good animal development, aesthetic appearance and farming facility. Some defects are also identified: heterogeneity, very slow growing and wild behavior. No practices of crossbreeding are observed.

The recent recovering of the breed is considered by the farmers as an innovation after a large period of abandon. A large fraction of these animals were dedicated to self-consumption in the families. Nowadays, the professionalization of the farmers is linked to the market connection and it has a great influence on the way it manages the breed.

Animal welfare and link to the territory are arguments toward consumers, especially for direct selling.

Farmers are proud to breed ancient breeds and claim to be better recognized. The differences with conventional farms are expressed on the questions of respect of animals and environment, more technical precision and more observation as a main challenge.

The *Pintadeau de la Drôme* guinea fowl is organized for a long time with a strong anchorage to the territory. Problems are more due to the urbanization of the area: problems of noise from the animals in the neighborhood, accessibility of land and minimal distance from habitations. Permanent stay of animals can induce erosion of the vegetal cover and sanitary problems, and needs an interruption of the farming of guinea fowl (for example with a production of poultry).

The adaptation of the animals is good according to the breeders' evaluation. The breed is stabilized and the selection process is based on adaptation to the local conditions (sun presence).

For a long time, this type of production is present in Drôme. A capital of knowledge is already at the disposal of the farmers. The animals still have their wings (for the industrial production, animals don't keep their wings) that gives a better taste to the meat.

Producers are proud to be involved in this particular production with aesthetic birds and flavored meat.

The Spanish Requena area (Valencia)

Without any native breed available for the farmers of this area, a large part of the questionnaire is not relevant. So, the answers collected towards the local producers are dedicated to some very important questions really relevant locally:

- Environmental impact of the present activities.
- Recovery of the native breed, the *Chato Murciano*.

Concerning *the environmental impact*, the main contrast with the results from the other areas of the project increase the public awareness in particular, the vulnerability of aquifers is mentioned as the main problem faced. The high risk of groundwater contamination is faced in the municipality of Utiel where impermeable pits and slurries lagoons had to be created in order to prevent leaching losses. The farms from this location should also ensure that they are watertight to prevent flow from other areas where infiltration may occur.

According to the reality of these intensive farming, another limitation is due to slurry application as a mineral fertilizer for crops. The lithology of the geographical environment has to be taken into account as well as the location of the lands producing crops. The same awareness is growing for identifying the more vulnerable zones. And the effective accessibility of water resources is a major factor to be managed.

A final point is concerning the landscape and ecological protection of some protected areas in the region (birds, wildlife, and community attraction).

The interest of introduction of native pig breeds is the second main difference with the other areas. Obviously, the farmers are using selected breeds in an intensive livestock system and they are reluctant to consider the native breeds, seeing no advantage in this regard. Most of the processors have the same feeling, having already a stable choice based on selected line of pork meat.

Only one of these processors declared his interest for creating a new differentiation among his actual production. He could be interested in a heavy animal with the highest proportion of fat, especially intramuscular fat and red meat. Author (Garcia-Menacho, 2002) indicated that the *Chato Murciano* a native breed form the Valencia region. And this breed has been re-introduced in an area with similar condition. The breed is a slow growing breed reaching 125 kg at 8-10 months of age, with larger fattening period and slaughter weight (Peinado *et al*., 2009). Some outdoor systems have been studied in order to enlarge the use of this local pig breed (Poto *et al*. 2007).

We could identify this potential involvement in recovering the native pig breed as a direct effect of the QUBIC project.

3.2.5 Discussion

A comparative analysis makes it possible to identify common features but also marked differences.

The input from the additional areas is also matter of discussion.

Common features

As common features, we can identify a low perception of environmental problems by almost all the breeders. Even if the risk of damage to the natural resources is obvious, it seems to be of minor interest in breeders' point of view. This point must become a priority for the extension services (Bonanzinga *et al*., 2010) in order to avoid further disqualification of outdoor systems for pig production.

The local breed is conferring a deep anchorage to farmers and animals are considered as well adapted to the way of rearing. The image of the local breed is giving an advantage to the breeders and they use such images when marketing the products (Casabianca and Fallola, 1994). All the breeders seem to be proud to be local breed promoters but they are claiming for better recognition at social level.

Main contrasts and category proposal

As main contrasts, we must distinguish the trajectory of each situation. The evolution of the breed is giving an orientation to the whole sector. We identify:

- Category A: *Established systems* such as *Cinta Senese* in Tuscany.

With a PDO already recognized at national level, the breed seems to be clearly stabilized.

But we notice a lot of newcomers attracted by the reputation of the breed and a lack of knowledge and technical culture in the management of outdoor systems.

And there is no management body for orienting the breed and selecting the best reproducers. A lack of strategic management and organizing framework can be identified.

- Category B: *Stabilizing systems* as the *Nustrale* in Corsica or the *Nero Siciliano* in Sicily.

Both of them are deeply rooted in local culture and applying for a PDO inducing some new questions (Lambert-Derkimba *et al*., 2011). Breeders show a family heritage and the technical culture is enforced by generations.

The strength of these two breeds is a community-based networking. But a lack of collective organization is one of the main weaknesses. The PDO application in both cases could bring some new stability and room for collective action.

- Category C: *Emerging systems* as the *Greek Pig* in Thessaly and the *Nero of Parma* or the *Mora Romagnola* en Emilia-Romagna.

In such situations, professional organizations are still lacking to ensure the future of the breed.

The technical basis is not as clear as a lot of newcomers begin to produce without any experience. The exchanges within the project have been very useful for these breeders because they need some technical models in order to design the local one.

Additional areas

The confrontation between the categories produced in the 5 areas with local pig breeds and the addition areas is very useful.

The Drôme situation is providing two contrasted situations. The *Grise du Vercors* poultry shows all the characteristics of the merging systems: the lack of technical model, previous knowledge and organizational devices are patent. So, it is easy to classify this first situation in the category C of our proposal.

At the contrary, the *Pintadeau de la Drôme* guinea fowl shows all the traits of the category A. The trajectory of the set of farmers involved comply the main characteristics with a technical model and PGI recognition. They are applying now for a PDO protection hoping a better valorization with this origin sign.

So we can assume that our categories are relevant even for aviculture.

Concerning the Valencia situation, the main contrast relies on the importance of environmental issues. In Requena area, intensive pig production systems have major impact on the environment, water, landscape. And, the territorial feature is dramatically modified leading to an intense reflection on these points.

We must remember that, in the traditional areas of local pig breeds, such awareness is absent and we notice that this was a real problem to be addressed. In fact, environmental issues should be of importance even in these areas: erosion, forest and soil damages, problems of water, etc. are actually observable. Predators and wildlife diseases were mentioned, but no consciousness on impacts from livestock activities is sensible.

Final methodological comments

This type of interview analyses, mixing qualitative and quantitative data, is useful to identify key topics and stakes for the breeders themselves and for territorial management of local breeds. This type of analysis also allows wide comparative study at a Mediterranean scale.

We show the relevance of categories built up on the basis of local pig breeds and extendable to poultry production.

The whole set of data could be used in a complete analysis, but we assume that the main traits of the various satiations have been clearly put in evidence.

Those key topics should be further studied thanks to a more qualitative analysis, using for instance semi structured interviews. A qualitative analysis should allow gathering breeders' concerns and trying to minimize the influence on the orientation of the answers, without a pre-construction of the themes. It could allow understanding better the dynamics of territorial management for local breeds and the stakes on different territories, and complementing this comparative approach.

3.2.6 Conclusion

According to the differences we identified, we carried out a "gap analysis" centered on:

- The link between the breeds and their territory within the various systems.
- In order to identify possible points of blocking and levers in the projects of territorial development of these breeds.

The local pig breeds are reared mainly in outdoor systems that could have

a major interest in terms of territorial features (Edwards and Casabianca, 1996). But at the same time, environmental issues should be addressed more clearly in the interactions with the breeders as their consciousness for this kind of problem seems low.

The local breed is a real asset for all the marketing issues, the good image and the attractiveness of such animals being asserted in all the areas of the project.

And the breeders of local pig breeds are proud to be identified as so, even if in some cases, they are claiming for a better recognition by the regional authorities and extension services.

The organizational devices seem to be missing in several situations and being more or less a problem in all situations. In some cases, activities are deeply rooted into ancient traditions and breeders are not really ready to engage themselves into collective action. In some other cases, recovery of the local breed is recent or effect of reputation of the breed attracted a lot of newcomers, so collective action is also lacking. This point should be noticed as a main issue of our map of territorial features.

A large range of various situations have been analyzed and several categories have been proposed. Some clear conclusions can be provided for each type of situation and breed.

For *established systems* like *Cinta Senese:* The situation is characterized by a lot of newcomers without experience, and some environmental problems not really taken into account by the PDO specification. The processed products should be protected in addition of fresh meat, because of risks of confusion at market level. It should be interesting to compare this situation to the Iberian pig situation where PDO is obtained for a long time.

The case of *Pintadeau de la Drôme* guinea fowl seems to be very near from this breed category.

For *stabilizing systems* like *Nero Siciliano and Nustrale:* Some similarities are observed between the two islands as this activity is rooted in the local culture. But farmers seem to face great difficulties to innovate and to organize. Environmental issues should be emphasized and PDO protection should be completed.

For *emerging systems* like *Mora Romagnola, Nero of Parma and Greek:* The three breeds are not really ensured till now. Breeders show a weak situation to be reinforced mainly at organizational level.

The case of *Grise du Vercors* poultry is similar to these emerging case studies.

Such comparative studies based upon breeder's viewpoints are quite

new in this area. They are supplying useful elements for future exchanges at Mediterranean levels, giving more relevant points to be emphasized by the extension services.

Acknowledgment

We thank the QUBIC project for giving us the possibility to manage the same questionnaire in the several areas of the project. We also want to thank all the scientific and technical staff from the various project partners involved into the data gathering and obviously the breeders willing to answer to our questions.

3.3 Production techniques

Carlo Diaferia and Pietro Baldini – SSICA

The identity of traditional products reflects the unique combination of local natural resources (climate, soils, local breeds and plant varieties, traditional equipment, etc.) and cultural ones (traditions, know-how and skills, some of which are transmitted through generations) in a given territory, linking the product, the people and the place.

The behaviour of many different contributors within the production area (farmers, processing companies, local consumers, public institutions, non-governmental organizations, etc.) and their interaction with other factors outside the territory, build over time the identity of a product linked to a specific place and to a specific group of people. This process involves different actors, who try to coordinate and harmonize their production and commercial practices.

The chapter describes the technological characteristics of cured meat products made from meat of autochthonous pigs genetics types prepared in the following geographical regions of the Mediterranean: Spain (Valencian Community, Cordoba Area), France (Corsica), Italy (Tuscany, Emilia Romagna, Sicilia), Greece (Trikalia). The key steps to define the originality of the product are (see description of products):

• A specific strain or breed.
• The feeding of the animals with a particular local feed.

The process conditions also play an important role, as maturation period, the salting or as the drying climate conditions.

The objectives are:

- describe the characteristics of the different products;

- analyze the solutions proposed by assessing the points of the SWOT analysis;
- identify the good practices and the common features;
- reflect on their transferability.

3.3.1 Product Description

Cordoba Area (ES)
Links to the geographical area

In the northern province of Cordoba, there are about 300,000 hectares of holm oak *dehesa*. In livestock management, including *montanera* as the final stage of fattening is amply demonstrated the importance of the pasture of the *dehesa* on the characteristics of the protected product.

From 2004 to 2010 the sacrificed pigs increased from 4,484 to 16,105 and the labeled pieces from 16,596 to 60,109.

Characteristics of production techniques:

1. Identification of seasonality
   Iberian ham is produced throughout the year, but it should be clarified that according to the stages, there may be some stages where there was no activity due to the characteristics of production. So there is no activity at slaughter during the summer months.
2. Product formulation and recipe information
   Only to supply parts for the manufacture of hams and protected by the denomination of Origin "Los Pedroches" pigs belonging to the Iberian pig breed. The pieces come with a weight of 12-14 kg and leaving a final product from between approximately 7-8 kg. The pieces are covered with common salt and stacked using a ratio of approximately 700g salt / kg of product. In this process no spices of any kind are used.
3. Stages of the process
   The Iberian hams are covered with salt and placed in containers of 24 pieces where they remain in the salting room at 0-3°C and 90-95% Relative Humidity for 1 day/kg of product.
   After salting the hams go to post-salting, where they stay between 40 and 90 days at temperature 3 – 6°C, rising 1°C per week to approximately 12°C at the end of process with decreasing RH from 86% to 76% approximately.
   Following the post-salting stage the hams go to the drying/maturing stage; in this phase the gradual dehydration of the product continues. The time spent, in this phase varies from 120 days to 18 months. In some cases the

temperature increases from 10-12 °C to 23-24°C, while the final RH is 74%.

4. Packaging and distribution
   In the process of manufacture of Iberian ham, this is not subjected to any process of packing. The sale is predominantly national (85%), while the international market only accounts for 15%.

Valencian Comunidad (ES)
Links to the geographical area

The area of production is limited to Requena's city. The city is situated in the most occidental area of the Valencian region. Requena's weather is classified as Mediterranean climate, but it has some Continental features given by the city's altitude (700m) and its distance from the sea.

As artisanal producers, the volume generated per month is considerably low, being roughly 80kg/month for each kind of cured product in study. Workroom and selling points are together in the same butchery but divided into different spaces.

The PGI covers a range of seven different types of Requena meat products under the denomination of "Embutido de Calidad de Requena": longaniza, morcilla, chorizo, salchichón, sobrasada, perro and güeña. The producers of 'Embutido de Calidad de Requena' use recipes, methods and rituals handed down from "fathers to sons" to recreate the traditional flavors of the area. However, there are five fundamental features that must be conformed to for an "embutido" to be accepted as artisan by the PGI:

1. Only the meat of the female and castrated male swine can be used.
2. The intestines used to contain the meat are completely natural to allow for the conservation of the sausage and giving an authentic taste.
3. Only top quality spices can be used and added at a specific time and in the correct proportions during production.
4. The local weather and geographical conditions makes it possible for natural drying with ideal conditions.
5. The artisan elaboration of each piece (limiting the daily production).

From all the products mentioned above, only the Salchichón and Sobrasada are cured meat products. Both products, have been made from long time ago using specific ingredients from the Valencian region. In case of Salchichón, the product has a variety which includes on their formulation dried fruits such as nuts, pines, almonds… coming from the Valencian region and with respect to Sobrasada their formulation includes orange juice (orange fruits are the most important cultivar in the Valencian region) and nowadays the use of olive oil has been included in this old recipe.

Characteristics of production techniques:

1. Identification of seasonality

   Whole year production exists for both products, with the exception of the hottest months of the year (July-August-September) due to the early drying effect and scab formation on the casing.

2. Product formulation and recipe information

   The Terms and Conditions established by the PGI force producers to follow the specifications of the seven products supported by the committee. Salchichón must be made using 80-90% of the lean parts of the swine (ham and/or shoulder) and 10-20% of fatty parts (Lard and/or Belly). Dried fruits are added into the meat batter in a proportion of 1-2%. Sobrasada must be made using 15-20% of the lean parts of the swine (ham and/or shoulder) and 80-85% of fatty parts (Lard and/or Belly). Orange juice is added in an amount of 6% and nowadays olive oil has been introduced in the formula in a proportion of 3%.

   In both products salt is generally used in an amount of 20g/kg. However, salt is commonly included in the commercial additive mixture.

3. Type of grinding

   In case of salchichón, an 8-9mm hole of mincer plate is used and with reference to sobrasada, the hole of plate is 3-4mm. After grinding, meat is mixed with the selected additives and spices by an electric meat mixer. It's important to stress that both products are made without starter culture addition.

4. Flavorings, spices and additives

   In both products, the terms and conditions imposed by the PGI, allow the use of almidons, preservatives, antioxidants and colorants, as well as the usage of ready commercial mixes.

   The following data has been extracted from old recipes and bibliographic sources provided by the PGI.

   4.1 Spices and Herbs

   - Salchichón is usually seasoned using milled white pepper (3g/kg), whole black pepper (1g/Kg), and occasionally some producers used to add cinnamon powder (0,5g/kg), nutmeg (1g/kg) and garlic (1g/Kg).
   - In the case of Sobrasada, the main spice is Sweet Paprika (30 g/kg), and some producers choose to add garlic (2g/Kg) and black pepper (2g/kg).

   4.2 Additives

   - Referring to the preservatives both products use nitrate E-252 as a preservative in concentrations (<250 mg/kg).

- Concerning the usage of antioxidants, salchichón uses E-301 (0, 5–1 g/kg) and sobrasada's formulation doesn't always involve the use of antioxidants, in case of use, E-321 is added in an amount lower than (0, 1 g/kg).

4.3 Coloring agent

- Both products use the red synthetic colorant (E-124), salchichón uses (<250 mg/Kg) and sobrasada's uses concentrations below 200 mg/kg.

5. Filling into natural casings

After mixture is done, both products are directly filled into lean natural casings using mechanical methodology. Salchichón is filled in two calibers: swine colon casing with 55-60mm and swine small intestine with 30-35mm In reference to the length, Salchichón generally has a 25-35cm in length. Cured Sobrasada is filled in two different casings: Swine colon casing with 55-60mm of diameter and swine *cecum* casing with roughly 115mm of diameter. In reference to the length, Sobrasada generally has a 20-40cm length.

6. Identification of local seasoning

The Drying-Ripening process takes place in traditional drying rooms, where manufacturers control the Temperature and HR by closing or opening windows as appropriate and protecting the products from any sharp changes. The weather conditions of the area allow a cold ripening of the products. The average conditions during the producing months are temperatures around 13-15ºC and a relative humidity of 70-75%.

The number of days of drying will depend on the weather conditions and caliber of the product. Manufacturers visually determine when the product is well cured. Usually, this point occurs when the product reaches a loss weight of 35-38%. In case of Salchichón, 50-55mm casings needs approx. 1 month of drying, while 30-35mm casings needs approx. 15 days. In case of Sobrasada, 115mm casings needs approx. 2 month of drying, while 50-55 casings needs approx. 1 month.

3.3.2 Packaging and distribution

After the ripening process, the amount of pieces which are not going to be sold immediately, are vacuum packed in their whole form until consumer demand. This kind of sale is mainly local and takes place in the same butchers shop or on specific dates where the Requena's Embutidos fair is held.

Tuscany Region (I)

Links to the geographical area

The Cinta Senese breed is present in the whole Region of Tuscany, a central Region of Italy. The cured meat products obtained from Cinta Senese pig are various: ham, salami, bacon, *coppa*, *soppressata*, *finocchiona*, shoulder and belly. Only 7 companies produce Salami and coppa whereas lard is produced by 5 companies and ham is processed by all the companies. Two processing plants prefer the winter production while the other processing plants are active all year long. One of them uses traditional drying chambers while all the others are equipped with cold air cooling system. Depending on the product surveyed companies employ varying amounts of additives. Twenty-five percent of the companies sell their products abroad as well as in the national and local markets, such percentage rises to 50% if one considers only the ham. The production is almost exclusively destined for sales with the exception of the smallest and traditional company which also produces for private use. All the companies selling products as a whole or as pieces and only the biggest company also produces sliced products commercialized in vacuum packaging.

Characteristics of production techniques:

Salami

History and generality: Salami is a typical product of Tuscan tradition characterized by lean mixed meat with typical diced pieces of lard throughout the meat with its rich flavor and full bodied rich in ancient perfumes. The cuts range from 500 grams to 2 kg. The area covered includes the production throughout Tuscany.

Technical characteristics of the transformation: The processing technique, among the various companies, is almost similar until sausage making. The lean raw material comes from the shoulder whereas the fat comes from the belly and the lard.

Heating, drying and seasoning vary not only for their execution or not (heating and drying), but especially for the planned duration of each phase and for its relative temperature and humidity.

Coppa or Capocollo

History and generality: Capocollo (or Capicollo or Coppa) made from processing the neck bones (a cut that includes the cervical vertebrae and the first four or five thoracic vertebrae with the attached muscles) is a salume that is present throughout the territory with different interpretations and recipes

depending on the area of production. The aspect of the slice is with part of lean alternated with layer of soft and delicate fat. The product is typical due to the curing process that follows the traditional techniques handed down for a long time.

Technical characteristics of the transformation: A small amount of garlic is added to the salt (premixed with the salt itself) while two companies also add the fennel. Three companies covered the entire product with salt. All companies washed the product after the period of curing whereas 60% of them use a wrapping package. Five out of 7 companies producing Coppa carry out the drying step while the other two move the product directly in the cells of aging.

Lard

History and generality: The fat is a product of charcuterie salted, seasoned, with added spice with a traditional process that has its origins documented since Roman times. It is obtained by treating the subcutaneous adipose tissue, starting from neck region up to the back, without the cheek and the belly, with salt and spices. Historical evidence on the nutritional value of the lard comes from the period of the Roman Empire; Justinian code reports that in the fourth century, the legionnaires were entitled to the allocation for two consecutive days of meat of mutton and the third day for a ration of lard. In the culture of pig meat processing, processing of the fat has always been of particular importance.

Technical characteristics of processing: The lard is the less represented product in the surveyed companies, perhaps because in many cases it is used for the production of sausages. Almost all the companies cover the cut with salt, 4 companies also add pepper and garlic while only 3 companies add other spices (rosemary, bay leaves, juniper, nutmeg). Two companies also do intermediate stages of washing and drying after the salting period whereas two other companies put the product directly in the maturation room after salting; one company sells the product immediately after the salting period.

Ham

History and generality: Pig rearing in Tuscany, has always been strictly at a familiar level, which is only covered in the “home” requirements; the animals were left outdoors, free to eat a wide variety of foods, ensuring good and tasty meat. Curiously, however, although it is a “family affair”, the pig

rearing and the storage of meat was protected by the law since the Middle Ages. It was however only around the fifteenth century, at the time of the Medici family, that the production of the Tuscan ham was regulated by provisions concerning the entire production process.
The seasoning has always been favored by the Tuscan climate characterized by the temperate "breezes"; tempered coming from East or West, in an area protected from winds from the North by the Apennines, with the alternation of fresh valleys and densely forested hills. This reputation is also due to the clever use, during salting, of essences and natural flavors typical of Tuscany. In fact each producer has a secret recipe that customizes its output. This is so true that the gourmets are able to distinguish the production area by only tasting the ham.

Technical characteristics of the processing: In regards to the ham, the fresh leg undergoes an average trimming in 5 plants, to reduced trimming in 2 and to high trimming in one plant. The ham is with bone in all the plants.
The thighs are fully covered with salt in 4 plants while in other 3 plants only a partial coverage of salt is provided. All the plants add pepper and 6 out of 7 include garlic. Five plants perform manual washing and 4 after the wash rest the thighs for a while. The drying step is carried out by 5 plants while the other two go directly to the curing phase. The end of the curing time is time-dependent and only 3 plants sometimes control the weight of the final product.

Emilia Romagna Region (I)
Links to the geographical area (Nero of Parma)
The operators are concentrated in the territory of the Parma Province and the features are very similar as they operate in the same territory. Operators involved in the processing phase are limited. This is due to the niche features of the Parma Black Pig system.
There are 7 firms involved in pork manufacturing of salame *(gentile, filzetta, mariola) coppa, lardo e pancetta, and culatello*. The processors are small size operations with the following characteristics:

- Small meat laboratory with strong ties to local tradition, often handed down the family line
- working in winter and autumn
- Using traditional environments often lacked of air conditioning
- Limited use of additives
- spices / flavors typical of the production area

Links to the geographical area (Mora Romagnola)

The operators are concentrated in the territory of the Apennines Faenza defined by regional planning rural intermediate. The local process of implementation of the pig bred Mora Romagnola is progressively becoming very important in the territory and represents not only the production aspect, but also plays a role in the exploitation of marginal or abandoned lands.

The firms involved in pork manufactures salame *gentile, salsiccia passita, coppa, lardo e pancetta, prosciutto* are small size operations with the following characteristics:

- working in winter and autumn
- centralized process of transformation
- Limited use of additives
- spices / flavors typical of the production area

Traditional process of meat products

The preparation of cured meat is essentially a continuous dehydration, in conditions allowing the optimal development of the parameters responsible for keeping and training of key sensory characteristics. Drying techniques can be grouped into two broad categories depending on the temperature of the air that may be close to or higher than room temperature (20-25°C) or refrigeration (4-6°C): "dry heat" and "dry cold" .

The temperatures of the first months of maturation according to the seasons (autumn and winter) are less than 5° C. The last part of maturing takes place at an ambient temperature that included an average of between 10 and 15° C, under conditions of slow dehydration. In this period, the processes run slowly and are strongly influenced by previous ones, but the main sensory characteristics are formed during the latter part of aging.

Salame

In ancient times when the meat of pigs finished in all sausages, the "salame" was one of the tributes that the men of the fief reserving to the "nobles". The "salame" is sacked in the pig intestine and aging for medium (*filzetta*) and long times (*gentile, mariola*). The characteristics came from the long tradition in pork meat processing, the specific know how and professional skills, the environment , and also the favourable climate conditions (cold an humid in winter).

The technique used is that of cold maturation during which there is a certain loss of weight and, consequently, water activity decreases. This phase includes several periods, the first of which resulted at lower temperatures (e.g.

2-4 weeks at 2-3° C and 2-4 weeks at 4-6° C). The last part of ripening takes place at room temperature that includes an average of between 10 and 15° C, under conditions of slow dehydration. In this period the process runs slowly with formation of the main sensory characteristics.
The process involves: a) grinding of meat and fat, b) the pork meats are mixed with salt, pepper, (garlic and wine), c) salami making, d) drying, e) seasoning. The storage temperature is preferably 12 - 14° C for the whole product, under refrigeration for vacuum steaks.

Lard
The Latin poet Orazio spoke of "simple vegetables seasoned with bacon fat" not lacking in rations of Roman soldiers. Lardo, remained for centuries until very recently a condiment, today is a *salume* in all aspects. The important thing is that it is derived from meat of pigs reared with particular care, salted and seasoned with proper technique.
The *Lardo of Nero of Parma Pig* is product with variable shape and thick not less than 3 cm. The colors of the pieces of pork lard are variable from white to pale pink. On the top of each piece is the skin of the pork and on the other side there is a layer of spice and salt, peculiar ingredients of this product. It could also be a thin part of meat, which makes the lard tastier. Each layer of lard is covered in salt, fresh garlic, rosemary, ground black pepper and other spices. The curing process lasts no less than a period of six months and due to the Lards extensive contact with the aromatic liquid called "salamoia". The operations of salting / aging are conducted at low temperatures.

Coppa
Cylindrical s*alume* made from a whole piece of pork back of the neck, between the tip of the head and the fifth-sixth rib of loin, length thirty - forty cm . The weight of Coppa fresh is between 4 and 5 kilograms. The cut of meat selected from the loin, for making the Coppa presents a layer of fat to keep it soft during the stages of maturation and improve the organoleptic characteristics.
The salting lasts from four to eight days, after which Coppa is brushed or washed with water, soaked in wine and subjected to the operation of "massage" and "pressing", added grain of black pepper and then wrapped in pig diaphragm. Finally we proceed to the traditional tying, with natural twine and the drilling of the casing.
The stage of maturation is carried out cold for a period between 90 and 300 days. The storage temperature is preferably 12 - 16° C for the whole product, under refrigeration for vacuum steaks.

Culatello

Culatello of Nero of Parma Pig has ancient origins. The first picture you can see in the greasy pole by engraver Bolognese Giuseppe Maria Mitelli (1634/1718). The first mention dates back to 1735 in an official document of the Municipality of Parma where compared to the prices of products produced from pigs. Another piece of the City of Parma, the Calmieri of "Meat Porcina salt" April 9, 1805, leaves no doubt about the existence of *Culatello*. Famous estimators were the composer G. Verdi and the poet G. D'Annunzio. The "*Culatello of Nero of Parma Pig*" is produced from the thigh muscles of the pig with a layer of fat, tied with string in order to form a sort of loose network. Muscle mass has the characteristic shape of a pear. Salting is carried out dry and lasts on average 6-8 days. After salting the stuffing is in natural casings (bladder porcine parietal peritoneum and perirenal pig). The drying varies between 30 and 60 days; the seasoning is not less than 24 months.
The characteristics came from the long tradition in pork meat processing, the specific know how and professional skills, the environment, and also the favourable climate conditions (cold an humid in winter). The operations of drying / aging are conducted at low temperature and high RH.

Sicily Region (I)

Links to the geographical area

In Sicily, in the Nebrodi Mountains, which are characterised by extensive and luxuriant woods, nearly all the Nero Siciliano pigs are reared and their meat is used both for fresh consumption and to make excellent salumi. The production of salumi in the Nebrodi area, and *salame* in particular, presents a traditional family craft of which the main differences are found in the quantities of the ingredients (salt, pepper, seasoning) added to the meat, cut into small pieces "*a punta di coltello*".
The products obtained through the processing of Nebrodi black pigs meat are: *salsiccia, salami*, capocollo, lard, bacon, ham and "guanciale". Their production is carried out throughout the year. In the production of sausage and salami, in compliance with local gastronomic traditions, black pepper is used as well as chilli and only in the sausage of the *Foeniculum vulgare Mill*. Normally are used for aging and ripening cells with average temperature and humidity. While, for the production of capocollo, "guanciale", bacon and ham in particular, are used ripening rooms built in traditional sandstone, with natural temperature and humidity. The final products are intended for sale in the local regional and national levels. Two producers have their markets abroad.

The products are sold whole, and are not required to be wrapped or vacuumed.

Salame
Descriptive sheet:
Slaughter: min. 12 months old and weights no less than 120 Kg / live
Filling with natural casing
Meat used Are: all cuts of Nebrodi pork with 10 - 20% of lard
other ingredients: sea salt 30 g / kg. Black pepper 3 to 4 g / kg.
Drying temperature controlled for 7 day
Ripening in local natural fit to teperature and humidity controlled, for a period between 2 and 4 months.
Final weight with average decrease of 50%

Salsiccia
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Filling with natural casing
Meat used Are: all cuts of Nebrodi pork with 10 - 20% of lard
other ingredients: sea salt 25 g / kg. Ground black pepper 3 to 4 g / kg. *Foeniculum vulgare Mill* 1 to 1.5 g / Kg
Drying temperature controlled for 4-5 days
Ripening in local natural fit for temperature and humidity or temperature controlled, for a period between 15 and 20 days.
Final Weight with average decrease of 30%

Capocollo
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Meat used: pieces cut from the muscles of the neck; mean initial weight 2.5 kg for each piece
Salting with sea salt: 32 g/Kg
Other ingredients: ground black pepper, sprinkled on the surface of the piece of meat
Following resting phase in the cold room at 0 ° C for 7 days .Then filling with natural casing, and steccatura".
Drying temperature controlled for 24-48 hours
Ripening in local natural fit for temperature and humidity or temperature controlled, for a period between 3 and 5 months.
Final weight Kg 1.3 to 1.8

Lard
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Salting with dry salt in stainless steel or sandstone for a period of 6 to 12 months
Ripening in local natural fit for temperature and humidity for a period of between 3 and 8 months.

Guanciale o "Buccularu"
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Meat used: pieces resulting from cutting the cheeks and throat of the pork.
Salting with sea salt 40 g/Kg for 8 - 10 days
other ingredients: ground black pepper, sprinkled on the surface of the piece of meat
Drying temperature controlled for 24-48 hours.
Ripening in local natural fit for temperature and humidity or temperature controlled, for a period between 3 and 6 months.

Pancetta
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Meat used: pieces resulting from the cuts portions between breast and belly of the pork.
Salting with sea salt 40 g/Kg for 10 - 15 days
Other ingredients: ground black pepper, sprinkled on the surface of the piece of meat
Following rolling and resting phase for 24 hours
Drying temperature controlled for 24-48 hours
Ripening in local natural fit for temperature and humidity controlled, for a period between 3 and 12 months.
Pancetta "steccata": after salting is ripening in local natural fit for temperature and humidity or temperature controlled, for a period between 2 and 5 months.

Ham
Descriptive sheet:
Slaughter: min. 12 months old and weights not less than 120 Kg / live
Initial weight from 9 to 12 kg

Final weight decrease of 30 %
Salting with dry salt in temperature controlled environment
First phase of maturation in temperature controlled environment
Ripening for a period between 12 and 24 months in natural room fitting for temperature and humidity.
Processing steps:
Salting - cover the ham over the entire surface with sea salt medium size, place it on a floor or a container slightly inclined (to facilitate the draining of water) half salting away the salt with a brush, then recover the ham. The salting period is one day per kg weight of the ham; for weights exceeding 10 kg an additional day of brining must be considered. At this stage, the ham must be kept in the cold room at a temperature between 0 - 2 C °. After the period of salting the ham is washed with warm water with a little wine vinegar
Pressing - after salting, for a period of about seven days, the ham is pressed with a weight equal to about half that of the ham itself.
Resting - The resting time is about 60 days at refrigerated temperature. After resting the ham is dried for 4-6 days at a temperature of about 18° C
Ripening - In this phase (12 -24 months), the ham is placed in a room for aging. When the ham has had a weight loss of around 20 - 25% it is then proceeded to be covered with lard (specially prepared).

Corsica Region (F)

Links to the geographical area:

People involved in pork processing are more or less the same than the breeders, as breeders are mainly at the same time breeder and processor. A great part of the producers are not really specialized in pig production. According to the results of a national enquiry (2000), there are 500 pig breeders in Corsica owning 26000 pigs, but only half of them are specialized in pig production with 17000 pigs.

In addition, a major part of the producers are not using the official slaughterhouse for their pigs, and veterinary services estimates the proportion of pigs slaughtered in farms at 60 to 70%. So, only few producers are in full conformity with the official rules (identified animals, killed in official slaughterhouse and having a full traceability). Among them, PDO applicants are the most numerous because of the obligation of official conformity for the PDO certification.

The processors are in general small size operators dimensioned by the herd size and the finishing period capacity. Only few of them have employees as in general family workers are mobilized for the processing period (i.e.

the slaughtering period: from November to March). Equipment is variable, from quite nothing different than 50 years ago, till very modern ones.

Product type and description:

In Corsica, pork meat is usually processed in a farm as almost all the peasants had at least one or two animals to slaughter for Christmas. Now this kind of production has disappeared and the traditional breeder with outdoors pigs and on-farm processing remains. It is quite difficult to say how ancient this production is as very few historical sources are available. According to the use of Corsican words that seems to have a very ancient origin (as *Prisuttu* for dry cured ham deriving directly from the Latin language), we should assume that such types of production have several centuries.

Pigs are reared mainly with natural resources all year long, showing a very low growing rate that explains the high age at slaughter. A very important tradition has been maintained about the slaughtering period: it begins in November and ends in March, using the winter for benefiting of the natural cold weather. Pigs are fattened with chestnuts and/or acorns during autumn and hopefully reach the slaughter weight in winter. If not, they are kept within the herd till next year, this is the reason why some pigs are 36 months old at slaughter but with a similar slaughter weight than the younger.

The products deriving from such original raw material are several. We decided to study only products local sector in applying for PDO recognition: loin salted and dried ("*u lonzu*") chine salted and dry ("*a coppa*") and the dry cured ham ("*u prisuttu*"). Other products are also typical such as dry cured sausage ("*u salamu*") and liver fresh sausage ("*u ficateddu*"), but presenting too much heterogeneity and a lack of common definition to be considered in our project.

Characteristics of production techniques:

Processors are not performing the operations through a scholar formation as all of them have been learned by the family tradition. Methods are traditional and very simple ones for salting, smoking (or not), drying and curing.

The main characteristics of the processing are

- To use the natural winter cold and very few of processors have frozen cells. But they have no possibility to monitor the salting process.
- To maintain the products in long ageing process. But without any assessment of the product evolution.

The most important parameter for a successful process is the raw material quality, freshness, well refreshed before processed and with hygienic

conformity. Seasonality has already been described, as no pig is slaughtered after the end of March.

In general, the local seasoning is natural without any air-conditioned equipment.

In general, no other additives than salt and pepper are used. In fact, with such original raw material, there is no need to enhance color or to use some aromatic additives. The only exception is for the fresh liver sausage but outside of our study.

Greece

Product type and description: Trikalian sausage

Links to the geographical area:

The recipe of sausage from Trikala goes back many years ago. Nowadays, it is one of the most well-known and popular product both in local and in national level. The product is of great quality due mainly to the unique characteristics of the local raw meat that is used.

Product type and description:

The recipe of sausage from Trikala is unique and lies on the meat quality. It is produced basically by local butchers, who keep well their little recipe ''secrets'' that differentiate the local product. Sausages are made from minced (ground) meat. Both the meat and the lard are minced through 12mm.

Product type and description: Tzoumagias sausage

Tzoumagia sausage is produced in Serres over the last 7 decades and is famous for its great taste. The product took its name from a village of Serres were it produced, in the Region of Central Macedonia. At the village and the nearby area, the guests, while admiring the wonderful sightseeing, can taste the unique buffalo meat, the tzoumagia sausages, fresh fish (grivadi) and buffalo stakes.

The main characteristic is that one of their ingredients is leek.

The most important manufacturing parameter is the ration between meat and fat and the spices used. As mentioned before, the main taste that differentiates the product derives from the use of leek. Tzoumagias sausage is produced during the whole year.

3.3.3 Peculiarities of the SWOT Analysis

The following table shows some peculiarities of the SWOT analysis:

common points (seasonality of production, characteristics of raw material, cultural heritage) and individual aspects (attendance at trade shows, products, DO).

Territory and type of products. Peculiarities of the SWOT analysis

Cordoba Area (ES) D.O Ham "Los Pedroches" Strengths: It is an indigenous product of the area, which it cannot be imitated and it is helped, in large part, by the benefits conferred by the Iberian pig breeding in the ecosystem of the *dehesa*. Weakness: The production is highly dependent on the number of acorns produced in the *dehesa*, varying from year to year Opportunities: It is an important source of job creation in rural areas Threats: Fraud in the labelling of the product which reaches to the consumer with false names and without fulfilling the demands required by the Denomination of Origin.
Valencian Comunidad (ES) Salchichon and Sobrasada Strengths: Strong promotion since 1993 through its annual Requena's Sausages Fair. Weaknesses: the progressive loss of the original flavor due to the use of commercial mixtures of additives and spices. Opportunities: Participation in public programs for SMEs as a way to have economic support for carrying out new projects and promoting Threats: Loss of cultural heritage: doubtful hereditary continuity.
Toscana (I) Salame, Coppa, Lard, Ham Strengths: The quality of meat and especially the fatty component, influenced by the acidic composition of the fat Weakness: the variability in the quality of the raw materials due to different livestock management Opportunities: the constitution of the consortium for the protection of the Cinta Senese, Threats: the production and marketing typologies are not yet standardized; the demand/supply ratio is often unstable since the chain is not well structured

E.Romagna (I) Salame, Culatello, Pancetta, Coppa, Ham, Lard Strengths: Production based on local know-how and tradition.The salumi are appreciated for its quality Weakness: Difficulty to produce all year and with constant characteristic Opportunities: Tourism increasing. Creation of a territorial brand Threats: The absence of a strong cooperation. Loss of cultural heritage
Sicily (I) Salame, Pancetta Capocollo, Ham, Lard, Guanciale Strengths: characteristics of products related to raw material and the type of diet Weakness: Small batches without a standardization of the product Opportunities: Involve a larger number of companies in the certification of the Slow Food. Threats: Insufficient generational replacement
Greece Trikalian sausages Tzoumagias sausages Strengths: raw material of great quality. Experience of the owner. Weaknesses: unsatisfactory co-operation with community authorities. Opportunities: local development. Promotion and communication. Threats: difficult working conditions.
Corsica (F) Lonzu, Coppa, Prisuttu Strengths: Raw material deriving of the extensive pig system. No ingredient which give the peculiarity of the final product. Weakness: The lack of technical formation improving the traditional features. The lack of some equipment that allows a better control of the product evolution. Opportunities: Important role of territorial authorities to develop traditional products, supporting the PDO application and all the devices able to clarify the market. Threats: Lack of young people able to maintain the production through generations

3.4 Distribution network

Jorge Molina (AINIA)

3.4.1 Introduction

This chapter introduces the different realities that the Mediterranean swine breeds have in their local context. The chapter illustrates the food chain features in each country as well as aspects about local and national marketing of the typical products in each region and country. Some of the main traditional breeds studied in Qubic project are described here, this chapter is intended to be just a snapshot of a more complex and interesting situation with an important potential in product commercialization, the potential of not only maintaining the economic activities of farmers in the periferial areas, but also increasing the consumer interest in this traditional values that have a clear impact on the industrial and social-cultural values of the Mediterranean arch.

3.4.2 Nebrodi black Pig

Brief analysis of the level of chain integration

The production system of Nebrodi black pig is constituted by a chain, which is articulated from the breeding of animals to the distribution of the end product. Every subject can carry out more than a productive role in the flow model. There are two strands in the production system: the first ranging from breeding to the sale of the fresh product and the second is responsible for the seasoned products transformation.

You can distinguish different models in the production system, each of them with a well-defined role:

- The so-called “long chain”:
  Breeder-> trader of animals-> slaughter house-> butchers-> retailing sale of fresh product
  In this case, the farmer does not address the handling of animals.
  Breeder -> slaughter house -> butchers -> retailing sale of fresh product
  In this case, the farmer handles animals and sells them.
- The so-called “medium chain”:
  Breeder - processor - > slaughter house <-> breeder - processor - > distribution
  In this case, the farmer - processor relies on other figures in the marketing and distribution of the product.

- The so-called “short chain”:
  Breeder - processor -> slaughterhouse <-> breeder - processor - seller and giver
  In this case, the breeder is processor and seller of their own products.

Some of these breeders are also giver of their products in receptive structures (typical restaurants, farm-holidays, typical stores with tasting etc...). Only in this phase, the slaughtering happens to the outside of the farms for sanitary and inspecting reasons.

The long and medium chain is very similar to breedings of intensive type, while the short chain is simple and of easy management. It is considered like an added value: the particular system of breeding and feeding, the processing technique, the different types of obtained products and their characteristics.

Only the “Consortium protection of Nebrodi Black pig” has demanded to the Ministry of the Agricultural Policies the DOP to the European Community.

Existing trade flows

Intermediaries subjects

Traders of alive animals, slaughter houses, processing industries and typical stores.

Channels and market segments

The end product is introduced on the market through associations of producers and intermediaries or it is directly introduced in the point of sale of typical products.

Final destination of the products.

The final destination of products is always the consumer. The channels trade through which products arrive to the consumer are illustrated in the following schedule.

3.4.3 Mora Romagnola

The production chain of swine meat and products of Mora Romagnola, processed in Faenza in the territory of the district, performs with a total aggregation between the basic producers (through the Consortium CO.PAF) and full integration between the actors of the chain. The area has considerable significance in terms of environmental, cultural history, and therefore can be considered strongly oriented to tourism development and can not ignore the activities related to local products.

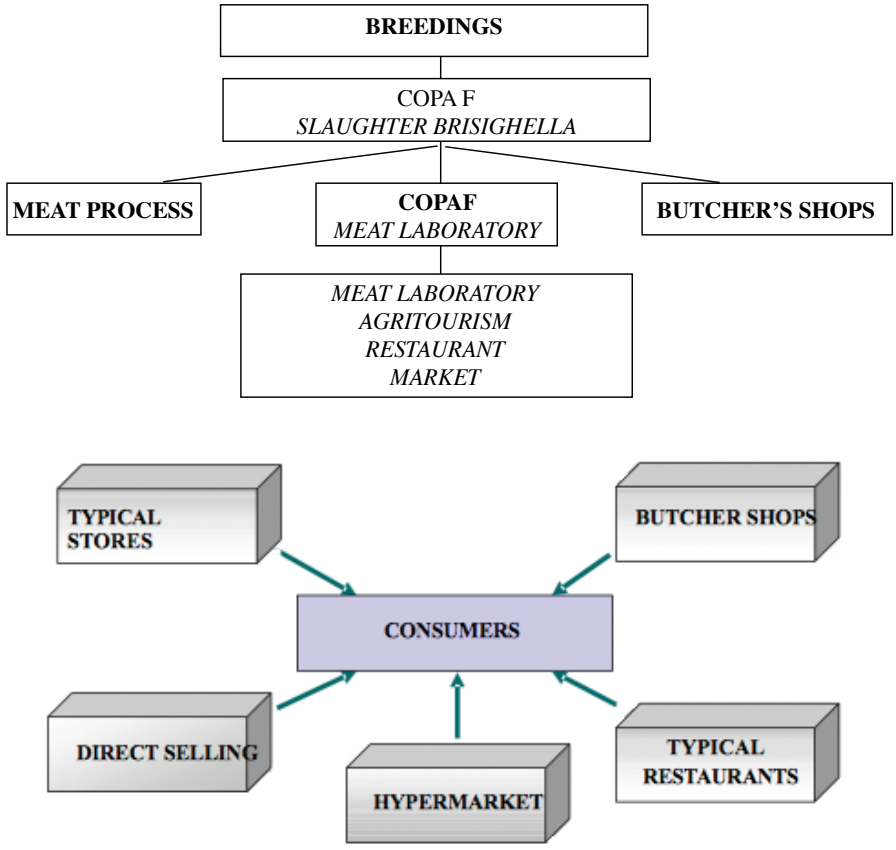


Fig. 1 - The production chain of swine meat and products of Mora Romagnola

The Consortium COPAF operates through its subsidiary cooperative marketing QS (Quality and taste) which unites the farmers of Mora Romagnola, which, according to the level of multi-functionality may:

a. Giving the product at the agreed price
b. Use the services of slaughtering, processing and aging of the consortium and then work to direct sales
c. Use the service of slaughtering and processing and then make the seasoning at the company's own laboratory

In the first case the Coop. QS can work products and then go to the distribution or sale directly or through a sale to shops and / or normal distribution. Further the Coop QS can sell the raw material (cut in half or cut) to delicatessen shops or laboratories, which in turn distribute for direct selling.
The volume of sales is medium-low and linked to the producer. The following commercial flows occur in the production chain:

57% to salumi company
23% to direct sale
20% to butcher and restaurants

3.4.4 Nero of Parma

There is a certain difficulty in processing the pork arising from the way the sector linked to the Parma Black pig is structured as, in part, knowledge and care in the processing of these meats have been lost, and few facilities are able to process for third parties for sale outside the local territory. The limit to selling locally for the majority of the farms is still a rather small area of activity given the market potential of these derivative products.

Operators are concentrated in the territory of the Parma Province. Operators involved in the post-rearing phase are limited. This is due to the niche features of the Parma Black Pig system: the number of farms, as well as production, are rather limited. This context reflects the situation of the farms and the supply chain of Nero of Parma pig. The collective mark has hardly known by consumers and farms often do not have sufficient time to deal also aspects related to marketing and communication as they are already very engaged in farming activity.

The shops are characterized by niche products and specialities. The volume of sales is (medium)-low and linked to the producer.
The following commercial flows occur in the production chain:
46% Farm > Sale to private individuals > consumer
23% Farms > Farm tourism kitchens > consumer
13% Farm > Sale to restaurants > consumer
15% Farm > Sale to shops > consumer
3% Farm > Sale to large retail chains > consumer

The above percentages do not refer to product quantity but to number of choices the operators interviewed make.

A large part of the meat slaughtered is used for their own catering, as well as the aging products. Through this channel, many clients purchase products directly.

These products, also because of their price band, are found on those places where quality products and products originating in the territory are offered for sale. Over the last few years, interest from restaurants and wine bars in these types of meat and products has increased.

With Parma Black Pig a rearing system can be developed compatible with the territory, able to enhance areas which are not very productive and mar-

ginal, as well as recovering types of traditional products which are now little known and perhaps not very appreciated by new generations, as they are different from the standard to which they have become accustomed.

There are many possibilities in the catering field, and in specialist shops selling high quality products and those which promote the territory.

3.4.5 Iberico breed Pig

Traditionally, the Spanish pig industry has been based on family-owned farm production coupled with rearing assorted native breeds in specific areas. The Iberian pig, customarily associated with the land occupied by the *dehesa* in the south-west of the Iberian Peninsula, has played a significant role in this process.

As the Iberian pig is the most significant representative of extensive Spanish pig farming, it is a unique breed which constitutes a major Spanish contribution to the world's pig genetic map. It is a traditional form of livestock breeding that has provided a livelihood for families in the areas where it took root, while the use of its resources has been crucial in preserving the *dehesa*'s landscape and keeping people in the rural areas they live in.

The Iberian pig is the result of centuries of adaptation and selection whose outcome is a pig that can use the natural resources of the *dehesa* every year to finish fattening on the latter's main fruit, acorns, very effectively turning their carbohydrates into an extremely distinctive fat. Without the presence of Iberian pigs these resources would become unusable, the *dehesa* would lack a basic source of economic support for its continued existence and, as in other areas of the Mediterranean basin, this Mediterranean forest would have disappeared.

Without the differentiation of acorn-fed Iberian pig products, this native breed loses its singularity and rationale as opposed to other, more prolific pig species which have better conversion rates and are more suitable for producing pork.

At the 2nd International Veterinary Congress in 1951, Dr. Benito Delgado Jorro wrote the following about the Iberian pig: "Where then is the reason for maintaining the current Extremadura pig if we are to move towards pig farming with higher economic output and whose products are more in tune with the tastes and palates of the Spanish people who are becoming increasingly choosy?" Fortunately he was wrong, and today the Iberian pig and the processing industry for its products not only continue to exist but also enjoy worldwide fame and recognition. However, it should not be forgotten that this

fame and distinction are attached to products from the *dehesa*, and more specifically from mast-feeding animals, which are very different to fodder-based intensive production in which animals are also often crossed with other foreign breeds and whose final characteristics have nothing to do with the former.

The key factors that make acorn-fed Iberian pig products different are the fat the pigs develop from eating the acorns (fat which is high in monounsaturated fatty acids, especially oleic acid, with natural antioxidants from the grass which control their oxidation) and also the arrangement of the fat in the muscle where it is very unstructured in the lean meat. This means hams can be cured for over three years, preventing the meat from drying out while at the same time spreading and transferring its aromatic compounds which are ultimately responsible for the distinctive flavours of the final product.

It is, as noted above, a type of animal husbandry that has traditionally been conducted in economically depressed areas with poor communications infrastructures and it has not received the attention it deserves from government. This means that quantifying Iberian pig production in the past in Spain is almost impossible since official statistics in the country have never distinguished by breed, instead merely differentiating between pigs reared in intensive and extensive farming systems and lumping the Iberian pig in with the extensive farming group, which strictly speaking is not correct.

Nonetheless, what data there are can provide an estimate and according to Ministry of Agriculture, Fisheries and Food figures, in 1955, before the Spanish pig industry in general had begun to put in place intensive production systems, 567,424 Iberian breeding pigs were tallied by the census in Spain, which meant they accounted for 36.6% of the national total. Thereafter, Iberian livestock began a gradual decline for a number of reasons, including the intensification of the production noted above which wanted smaller and less fatty animals tailored to the new tastes of Spanish consumers, with higher conversion rates and shorter production cycles, higher production volumes for enhanced industrialisation of product manufacture and, finally, the appearance of African Swine Fever, which drastically reduced the number of Iberian pigs. All of this meant that by 1988 there were only 32,882 breeding pigs in the census, just 1.8% of the national total. Then the long recovery and promotion of the Iberian breed began until by the late 1990s there were more than a hundred thousand Iberian breeding pigs and more than a million fattened Iberian pigs in Spain.

Although there are no statistics to confirm this, it seems fair to say that up until this point the bulk of Iberian pig production continued to come from extensive farming in the *dehesa*, its products were processed in relatively small volumes by artisan industries in the places where the pigs were produced,

and Iberian pig products, especially its primal cuts and in particular ham, were of high quality and clearly differentiated from other hams in Spain. They were very popular and their production was limited, which meant they had high market value and there were no surpluses. Traditional markets, in addition to those adjacent to production areas, included Madrid, Catalonia and the Basque Country. In many cases they were sold directly to the end consumer by processors and at most sales might take place through local retailers. Big box retailers did not have a significant presence in the sector.

In 2001, Royal Decree 1083/2001 of 5 October enacted the quality standard for cured Iberian ham, cured Iberian ham shoulder and cured Iberian ham loin made in Spain, which sets out the quality and branding characteristics which these products made in Spain have to meet. From that time on products made from pigs that may have up to 50% Duroc or Duroc-Jersey blood have been recognised as Iberian, and three categories of foodstuff were established: acorns, *recebo* (mixed acorns and fodder), which remain the staples in the mast-feeding system in the *dehesa*, and a third category, *cebo* (grain), which solely involves fodder and is used industrially in intensive feedlots with the same practices and customs, and even in the same facilities, as white pigs.

Later on, in 2007 this standard was amended by Royal Decree 1469/2007, of 2 November, and a fourth category of food was introduced, *Cebo de Campo*, for Iberian pigs fattened with fodder in extensive farming systems. This category had already been recognised in the Designations of Origin in Spain when the pig farms concerned were in the *dehesa*.

To find out what has happened in the Iberian pig industry since this regulation was brought in, the production data provided by the Ministry of Environment, Rural and Marine Affairs, divided into categories of breed and food for 2008, 2009 and 2010 (Table 1), and which are the only ones available, can be examined. They show that:

Iberian pig production soared to over four million pigs fattened in Spain in 2008, yet the figures for production that is still based on natural exploitation of the resources of the *dehesa* under the mast-feeding system are still much the same as before the standard came into force, accounting for between 23 and 30% of the national total. By contrast, the grain-fed Iberian pig category has grown and now accounts for the bulk of production. It involves a crossbreed pig fattened exclusively with fodder using intensive farming methods and has nothing to do with the traditional practice of mast-feeding; it now makes up between 64.9 and 71.52% of national production.

The name *"Iberian"* has been given to a pig that is 50% crossed with a foreign breed, with greater growth capacity and a shorter production cycle

for the farmer and higher meat output for the industry. Iberian (crossed) pig production has become mainstream with rates hovering around 87% nationally, while purebred Iberian pig production is now relegated to a minority position yet still tries to make a superior product that stands out from the rest of the large volume of domestic production. Its producers are usually farmers who remain in the *dehesa* and continue to use its natural resources.

The (farmer) producer and the (industrial) processor are merging and it is increasingly common to find processors who produce their own pigs, either directly or through integration partnerships. This greatly reduces the number of operators in the industry and moves most Iberian pig production and processing away from the traditional *dehesa* lands.

The disproportionate increase in the supply of products that are marketed under the umbrella term "Iberian" naturally enough has led to a fall in prices. This, coupled with contemporary marketing trends, has enabled the large food retail chains to enter the sector where they have now achieved a dominant position.

Iberian pig products have in most cases largely lost what traditionally made them different as far as consumers are concerned, and instead have become a product with much less added value, high volume production and in general all categories are being swept along by the increase in grain-based intensive farming production.

Tab. 12 - Evolution of different breeding and feeding sysems for Iberico in Spain

SPAIN	2008		2009		2010	
Iberian Pure breed Acorn	283,052	6.79%	254,231	8.59%	252,370	9.79%
Iberian (Crossed) Acorn	620,194	14.87%	594,206	20.08%	361,053	14.01%
Total Acorn	**903,246**	**21.66%**	**848,437**	**28.67%**	**613,423**	**23.79%**
Iberian Purebred Mixed Acorns and Fodder	19,747	0.47%	20,496	0.69%	3,445	0.13%
Iberian (Crossed) Mixed Acorns and Fodder	42,694	1.02%	29,199	0.99%	12,372	0.48%
Total Mixed Acorns and Fodder	**62,441**	**1.50%**	**49,695**	**1.68%**	**15,817**	**0.61%**
Iberian Purebred Grain Extensive Farming	1,271	0.03%	15,215	0.51%	5,199	0.20%
Iberian (Crossed) Grain Extensive Farming	8,028	0.19%	31,654	1.07%	37,888	1.47%
Total Grain Extensive Farming	**9,299**	**0.22%**	**46,869**	**1.58%**	**43,087**	**1.67%**
Iberian Purebred Grain	213,102	5.11%	93,703	3.17%	71,747	2.78%
Iberian (Crossed) Grain	2,982,957	71.52%	1,920,464	64.90%	1,833,891	71.14%
Total Grain	**3,196,059**	**76.62%**	**2,014,167**	**68.07%**	**1,905,638**	**73.92%**
Total Iberian Purebred	**517,172**	**12.40%**	**383,645**	**12.96%**	**332,761**	**12.91%**
Total Iberian (Crossed)	**3,653,875**	**87.60%**	**2,575,523**	**87.04%**	**2,245,204**	**87.09%**
Totals	**4,171,045**		**2,959,168**		**2,577,965**	

3.4.6 Nustrale Pig

The Nustrale pig production is mainly organized around the central figure of the breeder rearing his own herd, slaughtering his animals and processing his carcasses into traditional products. Such a figure is evolving a little having some new requirements as pig identification, obligation to bring his animals to official slaughter-houses, processing in agreed plants. Producers are still involved in direct selling because this system is providing the best margin.

The whole supply chain can be represented as the following figure:

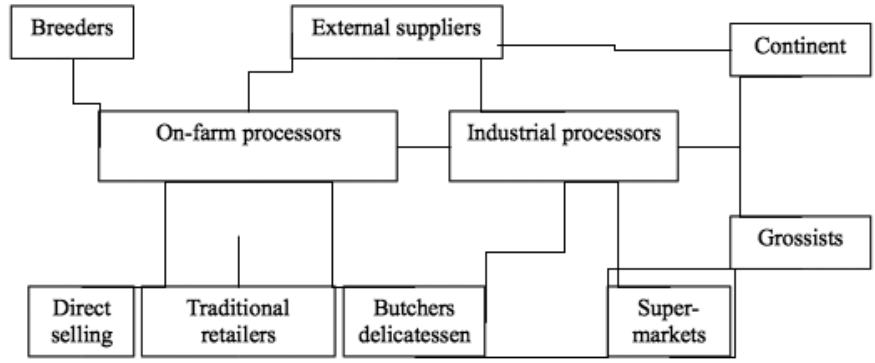


Fig. 2 - Description of the distribution network of Nustrale Pig

In general, Nustrale pig is processed directly by the breeders and sold by direct selling to usual clients (bold flow on the figure). But some breeders missing raw material are importing from external suppliers (as industrial processors are doing). So, at the market level, the situation is quite confusing because all these products are named "Corsican". This is the reason why the *Syndicat pour la defense de la charcuterie corse* is applying for a PDO protection of the local name, using exclusively Nustrale pig bred locally.

Type of food chain

The food chain is short, all the breeders being at the same time processors and sellers. Sometimes, breeders are selling their pigs to be slaughtered and processed by the buyer, and the average price of a carcass is almost 4€/kg. The processed products are evaluated at an average price of 24€/kg.

Some products can be sold to a retailer supposed to sell to the final customer (in general no more than one intermediary people). In this case, pro-

ducer can sell his production with - 15% and the retailer is majoring the price of 15 to 20%. It is quite difficult to evaluate the margin realized by the restaurants, but it is possibly higher.

Economic value of the final products

Prices have been collected from the producers involved in the application for a PDO. The table is giving the detail with the average of the prices according to the geographical area, distinguishing Southern and Northern part of Corsica Island.

Southern area is showing higher prices in particular for the dry cured ham (prisuttu).

In general, the products from the southern area are elaborated more traditionally: ficatelli (liver sausage) have more liver content, prisutti are cured for a longer time. Thus reputation is better. But prices in the Northern area are increasing regularly (1€/year) and we can suppose that the prices could be harmonized after a few years.

Tab. 13 - Average of the prices according to the geographical area

	2A (Southern)	**2B (Northern)**	**Corsica***
Products	**€/kg**	**€/kg**	**€/kg**
Prisuttu	35 €	17 €	25 €
Coppa	35 €	24 €	30 €
Lonzu	35 €	24 €	30 €
Saucisson	35 €	24 €	30 €
Figatellu	25 €	16 €	22 €
Panzetta	20 €	13 €	18 €
Bulagna	20 €	13 €	18 €

The lean pieces and preparations have higher prices than the fat ones (panzetta and bulagna).

Picture 9 - Corsican cured weat products

3.4.7 Cinta Senese

The production system of the Cinta Senese is simple but interconnected between the different levels of the chain. The chain goes from the rearing of animals to the distribution of the final product. In such system there is no single model of flux and each of the figures involved could represent one or more production and/or commercial categories.

For brevity we describe the main patterns detectable in the rearing system of Cinta Senese:

1. A first system provides a succession of categories each of them with an unique and defined role: farmer -> slaughterhouse -> processing plant -> selling company. Within some of these categories there may be others who occasionally interact, such as the feed industry that interacts exclusively with the farmer, or the transport companies involved in the animal handling.
2. A second system foreseen a shorter chain than the former system organized as: farmer that could transforms <-> slaughterhouse -> selling company. In such system the product passes two times in the farm since the

animals are sent to slaughterhouses and subsequently brought back from the farmer that, in this instance, it is also a transformer.

3. A third example is a system that, according to modern terminology, we might call "short chain", which contains the figures of farmers, transformers and sellers in a single entity. For obvious reasons only the slaughter phase is outside the circuit, all the other activities are carried out within the farm.

The production chain of the intensive pig farms is characterized by: fragmentation between the agricultural and the industrial phases; existence of a flow of imported animals and meat; complex commercial channels. The Cinta Senese pig chain is much simpler and more manageable. The final price of the Cinta Senese products, although high, is in fact largely due to the special connotation of the productive system, which is characterized by type and characteristics that allow to have an added value of the products.

The only example of a volunteer link among Cinta Senese breeder is the "Consortium of Cinta Senese's safeguard", born in 2000.This consortium is an association of breeders of Cinta Senese, that in the process for obtaining a trademark of Protected Designation of Origin (PDO) for fresh meat.

In 2006, the Consortium has obtained temporary protection at the national level and in 2007 the North East Quality Institute (INEQ) started with the controls, and in July 2011 the UE adopted a Regulation on PDO, which spent six months if, no facts appeals, will affix the label(PDO) on Cinta senese fresch meat.

The traceability systems of Cinta Senese products are attributable to the traceability of fresh meat of PDO. This system is documentary which provides full monitoring of the product starting from the marking of the animal and ending with the labelling of the fresh meat – the sole product to have the Cinta Senese PDO - in all its major components: half-carcasses, anatomical cuts and, in some cases, commercial cuts. Each exchange of goods - animal and / or meat – among the figures of the chain is monitored by official documents containing all the information necessary to trace the route of the product. Control management is a task of the North East Quality Institute which is in charge of the periodic control of flows and of the compliance of the production rules defined in the specification. The main critical points of the system relate to some items of animal management. In particular, the slaughter age (not less than 12 months) and the admission of the animals to the Herd Book of Cinta Senese, are essential requirements without which the product is excluded from the PDO.

The system is cumbersome, it ultimately provides a quantification of

the raw material in input - monitored at slaughter with recording of the live weight of the slaughtered batch – and of the final product exiting from the processing plants. The PDO system provides the registration to the Consortium, and the consequent compliance to the rules of production, of all the figures of the sector: farmers, slaughterhouses, processing plants.

Description of the trade flow of typical products.

Intermediaries figures

Feed industry, transport companies, slaughterhouse, processing plants, selling companies.

Channels and market segments

The final product ready for sale can continue its pathway in three different channels and market segments: cooperative (i.e. associations of consumers or producers or dealers); intermediaries and / or wholesalers or enter the channel of retail sellers.

Final destination of the products.

The final destination is always the consumer, to which the products come from the retail channel (figure below).

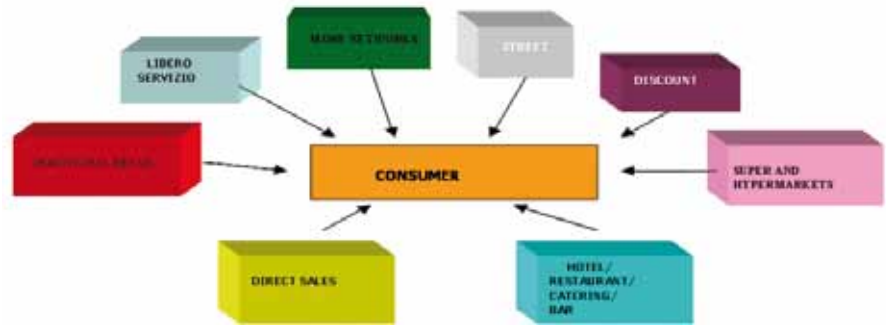


Fig. 3 - Description of the trade flow of typical products - Cinta Senese

The data relating to the productive chain of the Cinta Senese were provided by the Consortium which has a system of certification and traceability in the year 2010 were slaughtered animals in the circuit of the 3386 Consortium for a total of 425,232 pounds of fresh meat produced, were also makes about 4150 hams.

Picture 10 - Typical salumi from Cinta senese pig

3.4.8 Conclusions and comparative among the regions

The traditional values that are behind the production of traditional meat products are really important for the survival of regional food chain ecosystem. In these social vs. industrial "ecosystems" the combination of economic, environmental and social values are normally in a difficult balance.

There are great possibilities around the marketing of the traditional meat products, and at the same time, there are big opportunities when a cross knowledge contamination occurs among the different Mediterranean breeds and among the experience of different regions.

As a reflection from the previous pages in the following table there are a comparison among some of the most important Mediterranean breeds; the table shows a specific Gap analysis and training needs, from the point of view of the food chains distribution networks and their actors.

	GAP´s	Training Needs
Nebrodi Black Pig (Italy)	• Limited number of farms due to the morphology of the territory and natural habitat location of the breed • Format of sales, sometimes not consistent with the market demands • Lack of specific marketing channels (both domestic and foreign)	• Food chain market orientation • Awareness of conservation of traditional races and the territory • Implementation of quality standards as part of dissemination of a common development policy
Mora Romagnola / Nero of Parma (Italy)	• Traditional meat products food chains creates economies of scale that are sometimes uneconomical for big companies • Large investments in fixed and circulating capital to keep stock of high value added products (specially hams) • Inefficient market structures	• Food chain market orientation • Implementation of quality standards as part of dissemination of a common development policy • Awareness of conservation of traditional races and the territory
Iberic Pig (Spain)	• Large investments in fixed and circulating capital to keep stock of high value added products (specially hams) • Lack of standardization of products • Lack of real knowledge of what an Iberico product is from the point of view of consumer	• Marketing strategies and techniques • Food chain market orientation • Raise awareness to minimize the food chain environmental impacts of waste
Geek Pig	• Lack of specific marketing channels • Lack of existing large cured meat processing industries • Short marketing channels	• Awareness of conservation of traditional breeds and the territory • Food chain market orientation • Raise awareness to minimize the food chain environmental impacts of waste
Nustrale Pig (Corsica)	• Lack of existing large cured meat processing industries • Short marketing channels • Abandonment of livestock production, lack of generational replacement	• Awareness of conservation of traditional races and the territory • Food chain market orientation • Raise awareness to minimize the food chain environmental impacts of waste
Cinta Senese (Italy)	• Small businesses • Inefficient market structures • Format of sales, sometimes not consistent with what the market demands	• Food chain market orientation • Awareness of conservation of traditional races and the territory • Implementation of quality standards as part of dissemination of a common development policy

Acknowledgment

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3.5 Gap Assessment

Carlo Diaferia and Pietro Baldini – SSICA

3.5.1 Analysis of good practice and territorial development of breeding "Nero of Parma, Mora Romagnola, Cinta Senese, Greek Pig, Nebrodi Black Pig, Nustrale, Iberian Pig"

Through the detailed investigation of good practices, their reliability main reasons for their success, identified ideas, the strategies to be applied to other areas with specific characteristics, needs and similar issues. A good practice diffusion involves many different actors. Breeders, producers, processors, traders and consumers share know-how about good practices regarding breeding, production, processing, preservation, trading and even use or consumption of the product within and outside the production area. Collective action is necessary and should be considered from the onset of the identification phase. Mobilization of the local actors is a fundamental step, and requires raising awareness on the potential for development of traditional meat products.

Good practice is an innovative action that solves a problem in a more efficient way compared to known established practices.

The good practices describe the following aspects:

Breeding: The survey contributes to describe and to analyse the situation of farming of particular local livestock genetic types, belonging mostly to the swine, and of commercial destination of their products. In particular they are examined situations of 7 local pig genetic types: "Nebrodi Black pig" in the territory of Nebrodi Mountain (Sicily, Italy); "Cinta Senese" in Tuscany (Italy); "Mora Romagnola" in Romagna (mainly in the province of Ravenna) (Italy); "Nero of Parma" in Parma Province (Italy); "Nustrale pig" in Corse (France); Local Pig in Greece; Iberian pig in the Province of Cordoba (Spain). To complete the picture, for comparison purposes, an intensive pig production with high territorial value is examined: Improved pig (Large White, Landrace, Piétrain, White Belgian) in the Plana de Utiel-Requena (Valencia region - Spain);

Environmental problems: Environmental and sanitary problems must be identified and the way the farmers face them has a major interest. The problem is quite classical in intensive pig production system and concerns the slurry management at farm level. The number of animals for the forest area is a real problem but in general underestimated by the breeders.

Definition of the production area: Description of the production area. When needed, distinction between the production area of the raw material and the production area for processing and conditioning.

Demonstration of the specific quality linked to geographical origin: Focus on the elements justifying the link between the specific quality and the resources in the geographical area (natural and human ones).

Name of the product: Indicate the traditional name of the product

Description of the product: The main physical, chemical, microbiological or organoleptic characteristics of the product, focussing on features that are easily assessable.

Ingredients and raw materials: The ingredients and raw materials that should be used in the production process, and/or ingredients and raw materials that should not be used.

Definition of the process: The method for obtaining the traditional product in all the phases of the production process (agricultural production, transport, processing, conditioning, seasoning/aging and including final packaging). If needed, insert explicit prohibition for using some production methods. Focus on relevant phases and aspects.

Control plan - verification system: Description of how the controls will be used, the references needed, and the certification system.

3.5.2 Breeding

The breeding refers to a sample, the most representative, of the rearing system of each breed in a well-defined territory which usually corresponds to the area of origin and / or of maximum spreading. Almost all the considered herds make the complete cycle and only for the *Mora Romagnola* some farms were surveyed (17%) in which only fattening is present. On the other hand, in the realities of local breeds, this latter type is rather rare and temporary, as there is no need to specialize the farming of these breeds. The summary of data shows a remarkable homogeneity among the realities analysed with regard to farm size, measured by the average number of sows. They are always realities based on a limited number of breeding pigs, with 30-40% of those managing less than 5 sows. One exception is the reality of the *Nustrale*

pig, having a greater presence of medium-sized farms (6-50 sows). It is to record, in the case of the *Cinta Senese* in Tuscany and *Mora Romagnola* in the province of Ravenna, the presence of large farms (at least for the local pig breeds), which indicates a tendency to move towards economies of scale. Also the reality of the *Greek* Pig production appears oriented towards medium-sized herds, with almost half of the farms that keep more than 100 sows.

As a comparison with the actual production of local pig breeds, it can be reported what emerges from the report on the Plana de Utiel-Requena. In this region of Spain, a purely industrial-type pig production is implemented with a high specialisation of the various productive phases so that on 114 farms, 92 are only for fattening and 12 only for multiplication, breeding or nursery. Only 10 farms make the complete cycle. In this situation, the herd size, measured as number of sows, refers to classes that are completely different from those used for the local pig system because only 20% of the companies under investigation raise fewer than 50 sows (representing only 1% of the total sows) and another 20% (57% of total sows) is in class between 1500-2500 sows.

The following table shows the distribution (%) of herds in dimensional classes on the basis of number of sows. In parenthesis the incidence of sows on the total.

Tab. 14 –Distribution of the herds

	Herd size (n. of sows)			
	1 – 5	6 – 15	16 – 50	> 50
Nebrodi Black Pig	37	33	30	
Cinta Senese	29 (6)	38 (17)	21 (23)	5 (30)
Mora Romagnola	37 (7)	48 (40)	10 (23)	5 (30)
Nustrale	4 (1)	52 (33)	44 (66)	
Greek Pig	10	10	30	50

The area covered by the DO *"Los Pedroches"* is formed by 32 municipalities in the province of Córdoba, seventeen of them located in the region Pedroches Valley, eleven in Guadiato Valley, two in Middle Valley of the Guadalquivir and the other two in the Alto Guadalquivir.

Los Pedroches is one of the main production areas for Iberian pig. There are more than 5,000 farms in that sector and about 50 manufacturing industries of pork products. This industry is recently expanding and improving productive structures in order to be able to tackle the huge number of pigs

reared in the region, which until now farmers were forced to sell to other production areas where there was already a Denomination of Origin (DO).

The region of Los Pedroches has an area exceeding 300,000 hectares of pastures of oak, adapted from the original ecosystem on the Mediterranean forest. Traditionally livestock production has been developed in an extensive regime, becoming a clear example of sustainability. The *dehesa system* underlies different breeds of sheep, cattle, and in this region, mainly Iberian pig. Traditionally, the management of the Iberian pig presents long cycles of production, with a seasonal use of all available resources: acorns in autumn-winter, pastures during the spring and stubbles in summer- fall. Therefore, it was very important to schedule the farrowing sows in order to provide enough food to the animals in its early stages.

The quality and flavor of hams, as well as sausages, are highly appreciated by the national market, and also gradually appreciated by international markets. Indeed, the internationalization of these products is one of the main challenges of the processing industries, as well as strengthening the quality mark Los Pedroches, covered by the Denomination of Origin *Ibéricos de Los Pedroches*. This DO was recognized by the Ministry of Agriculture of the Government of Andalusia in 1998, although it was not until 2004 when it started its activity, with the slaughter of protected animals certified by its Regulatory Board, following strict quality controls on the traceability of pigs, breed, diet, extensive breeding scheme and the final product under its own display criteria.

3.5.3 Identification of good practices

A summary of Good Practices in use in the surveyed farms is presented:

- Do not apply slurry during summer season close to urban areas to prevent odor nuisance.
- Compost slurry with straw or wood shavings before land application
- Adapt feed to animal's live weight or to animal´s age. Use different feeds.
- Use chips in animals to limit feed intake automatically.
- Use an improved slatted floor with increased surface compared with that proposed by animal welfare legislation.
- Do not cut piglet's tooth to avoid damage to sow's nipples
- Proper agronomic use of slurry.
- One of the farms has an outside lagoon with a capacity of 1500 cubic meters for slurry storage.
- Heating system controlled by computer.

- Gas screens heating.
- Use of automatic ventilation. Automatic ventilation regulating device for windows.
- Application of medicated water.
- Cleaning of facilities.
- All-in all-out system.
- Disinfection of the veterinary material.
- Adapted drinkers to nursery in the piglet's transition farm.
- Iodine baths to prevent infections
- Pens are open every now and then for the piglets to exit. Therefore, the time piglets are kept locked is reduced and thus the fights decrease.

Here are detailed good environmental practices which are carried out in the breeding of Iberian pig in the production area of Denomination of Origin Pedroches. Many of these good practices are aimed at preserving the *dehesa* ecosystem that is basic to the Iberian pig breeding.

- Placement of protective fences around the roots of the oaks to protect them from the animals on the pasture.
- Performing duties in support of natural or artificial regeneration by sowing or planting trees.
- Collection of slurry before the rains to prevent the accumulation of nitrate in playgrounds, by trenches placed on a slope.
- Avoid if possible the visual impact on the farm, by planting resistant trees to nitrates and deep roots, such as mulberry.

Other measures that can be considered good practice in an extensive livestock facility and may have a positive impact on the environment as listed below:

- Establish training programs for the staff of the farm. Operators must be familiar with the production systems and be well trained to carry out the tasks for which they are responsible. They must learn and understand the impacts and environmental risks linked to the activity performed.
- Record the consumption of water, energy, feed on the farm, to achieve better efficiency in the use of raw materials.
- Establish an emergency protocol to respond to any unforeseen incident. The protocol should identify potential sources of incidents with potential environmental impact, conduct a risk analysis and develop control measures to prevent, eliminate or reduce risks associated with potential incidents identified.

3.5.4 Meat products

Were collected and analyzed 9 good practices that represent the search for positive solutions shared on the technique of preparation/aging meat products.

Tab. 15 – Working Phase and Good Practices

Working phase	**Solutions**
	GP (good practices)
Temperature of meat and storage rooms	At the reception, the temperature of the meat carcasses and meat pieces must be below 5ºC. The storage temperature is done at 3-4ºC in refrigerated chambers, and during the processing step, the temperature doesn't exceed 5ºC until the casing filling step.
Selection of meat and mixture preparation	Keep the temperature of meat to appropriate values (refrigeration), assessing the time to stop the meat under conditions of controlled temperature. Always operate with facilities and equipment clean and hygienic conditions in the best possible.
Casing preparation	The natural casings are previously decontaminated using vinegar and it is common to use oranges, citron to give a better flavor to them. Previous to their use, natural casings are submerged into fresh water in order to desalting them and for avoiding their breaking.
Weighing, milling and mixture preparation	Prepare all the ingredients in appropriate quantities. Grind / cut the meat (fat and lean fractions together or separate depending on the type of sausage), add ingredients and any additives, mixer mechanically or manually. The quantities of the various components can be made on the basis of a recipe or subjective "eye", this second method may be acceptable to the choice of the meat parts but may have problems of accuracy for ingredients and is to be discarded for food additives (e.g. nitrate), used in very small and not noticeable without the aid of a scale sufficiently precise.
Salting phase	Use appropriate salting temperatures between 2 and 5 ° C and ambient humidity values > 75%
Control of environmental parameters (T and RH) during maturation	The correct environmental characteristics and the constant visual supervision of the products during its drying and curing step allow producers to avoid problems with final products.
Traceability	The product label has the necessary information for allowing its traceability (product name, ingredients, batch number, manufacturer's name and sell-by date)
Self-control plan	Microbiological analysis of the surface and the products. The surfaces analysis is carried out twice a year, and in case of the cured products, the microbiological analyses are carried out once a year as well. Can be predicted more frequent controls
Training	The set of actions structure is designed to increase the knowledge and know-how of employees. In traditional activities is ensured between staff younger and more experienced

The solutions can influence the final characteristics of the products. Therefore, any change in the production cycle must be evaluated carefully and should be considered the need to change any of the other parameters.

For instance, for traditional products the lost salt content and the decrease of fat leads to an increase in water activity thus the likelihood of unwanted microbial multiplication which can be remedied by changing the recipe (use of sugars) or some aspects of technology (drying at low temperatures for a sufficient time to reduce the values of water activity).

The good practices identified are applicable in the following schedule of work which provides assistance on temperature and amount of available water by adopting some simple measures:

- good dehydration of the fresh meat at low temperature (as close as possible to 0 ° C);
- stop salami for 24 hours before drying;
- low drying temperature (below 10 ° C);
- salting stage at low temperature (2 - 4 °C)
- good dehydration during the first days after casing;
- temperatures of aging not too high;

The following table shows the good practices used in the preparation of meat products to control the microbial proliferation and issues that limit its use

Tab. 16 – Good Practices and control of microbial parameters

Good Practice	**Impediments**
Hygiene of slaughter and processing	None
Use of low temperatures for the storage of meat	None
Decrease of water activity	None, but control other parameters
Decreasing pH or increasing acidification	Sour taste, chewy texture and light color of the product
Use of low temperatures during the drying and curing	Seasoning time longer
Use of long times of aging	Products of consistency “woody”, flavors and aromas of “old”, mites or mold depend on the conditions of the environments of aging.

3.5.5 Guidelines for the preparation of long aging salami

The basic ingredients of dry sausages are lean meat, pork fat, salt, sugars, spices (pepper, coriander, garlic,..), nitrite or nitrate . An antioxidant (sodium ascorbate or ascorbic acid) is sometimes added to prevent the formation of lipid peroxides. Manufacture can be divided into the following stages: first, raw materials and ingredients are mixed, subsequently the mix is stuffed into casing, and then the sausages are dried. Dried meat products are preserved primarily by the reduction of water activity. Microbiological inhibition and inactivation in dry-cured meats are mainly achieved by low moisture content (and low water activity a_w), curing salts, and sodium chloride. The rate of drying should be properly controlled during maturation. Excessively fast drying should be avoided as this can cause case-hardening, whereas excessively slow drying may result in undesirable microbial growth on the product's surface. The rate and amount of drying during the maturation process depends on factors such as temperature, air velocity, relative humidity, type of sausages. The evaporation rate depends on the difference between the a_w of the meat or product and RH of environment. The drying (even partial) of the external surface causes a migration of water from internal areas, wetter, towards the external ones. The speed of this phenomenon (diffusion of water) depends on the difference of water content (more precisely the a_w) between the internal and external area, the temperature and the characteristics of meat (the meat of mature animals lost water less easily), the amount of fat (fat contains small amounts of water), pH (pH less facilitate the diffusion of water) and temperature (the higher the temperature the higher the rate of diffusion). To reduce the risk of superficial ring can, by adjusting the RH, decrease the evaporation rate to be equal or close to that of diffusion. This solution is not always feasible for both the difficulty of maintaining the RH constant at very high values (80%) and because, at a very high RH, the surface of salami can develop a negative microbial flora .The sausage contains a certain amount of fat easily oxidized, because the oxidation is a complex process that requires the presence of air and can result in particularly unpleasant tastes and odours you should check the contact between air and product at various stages of preparation. The first steps (storage of meat and fresh mixture) for low temperatures and shorter time generally adopted do not present major problems while the later ones for higher temperatures and because, due to some changes (hydrolysis) fats are more easily oxidized. One should therefore avoid contact with the air of the fat fraction adopt-

ing those simple rules well known: substantial elimination of all air pockets between gut and mixing, filling the mixture after compacted etc.. In addition some attention should be paid to the microbial surface, because the moulds and yeast avoid direct contact of oxygen and improve the characteristics of the product.

The preparation techniques influence the metabolism of microorganisms and thus, indirectly, the acidification of the product. Below some indications to reduce the acidification of the salami :

- dehydration of fresh meat at low temperature (as close as possible a 0 ° C);
- take the sausages at low temperature (2-4 °C) for a few days (cold drying);
- drying temperature not too high (below 18 ° C);
- aging temperature not high (below 10 °C);
- first stage of aging at low temperature.

Below the description of the main operation for the preparation of the traditional salami.

1. Receipt and raw materials section

The raw materials are introduced into meat production, selected, sorted and stored properly (hung on trolleys, put on *baltresche*, etc.).Can be done both instrumental measurements (weight, temperature, pH, etc..) and sensory evaluations on the quality of meat and fat and hygienic conditions.

The operation is normally performed at relatively low temperatures (<12° C) only during the winter and in unheated rooms. Preventive measures must be commensurate with operating conditions.

2. Storage and refrigeration

The raw meats are stored at temperature of refrigeration, observing appropriate standards to prevent pollution side (avoiding contact with walls, other raw materials and finished products) and ensuring adequate air circulation.

The operation is performed at temperature below 7 °C.

3. Cleaning

The meat is prepared for further processing by removing parts (connective tissue, excessive fat) that would determine the unsuccess of the product. The cleaned meat is placed in / on suitable media (cart, *baltresche* etc...); this is done normally at temperature below 12 °C only during the winter and in unheated rooms. Preventive measures should be commensurated with operating conditions.

4. Cooling under refrigeration (Possible)

The raw meats are stored at the temperature of refrigeration, observing appropriate standards to prevent unwanted contamination (contact with walls, other raw materials and finished products) and ensuring adequate air circulation.

5. Weighing, grinding, mixing

All ingredients (meat or not) are weighed, coded according to recipes, the fractions of muscle and fat are cut (knives, meat grinder, etc..) depending on the type of product you want, all components are combined and subjected to "mixing" (manual or mechanical) to obtain a first blend component (myofibrillar protein extraction). The mixture can be stored in suitable containers or immediately filled at temperature below 12 °C.

6. Conditioning mixture.

The mixture is kept at temperature of refrigeration in trolleys, *baltresche*.

7. Stuffed

The mixture is stuffed into natural casings properly prepared, the salami are tied and drilled to eliminate air pockets between the mixture and casing. The salami can be brought to the rooms used to dry or stored at temperature of refrigeration. In the first case are hung for correct drying; in the second can also be placed in suitable containers . This is done normally at low temperatures.

8. Resting under refrigeration (Possible)

The sausages are left in a suitable temperature (refrigeration) before drying.

9. Hot drying

Sausages are subjected to dehydration enough to dry a first fraction of the surface, heat treatment is extended to obtain a temperature sufficient to allow the rapid multiplication of microorganisms characteristic and encourage the formation of organoleptic characteristics and / or chemical physical (low pH and aw) . Drying is done either by using devices other than the natural (structured system, fans, hot and dry air produced in different ways (stove, etc.).

10. Cold ripening

The sausages are left in the conditions of slow dehydration at temperatures that prevent the proliferation of unwanted germs (temperature

between 2-4 °C). This phase is conducted after the drying of the casing. The seasoning is made in natural or conditioned environment, the different times are related to the size of the sausage (longer for larger salami).

11. Hot seasoning

The sausages are left in conditions of dehydration at temperatures (16-18°C) that permit the formation of the desired functional and organoleptic characteristics. The seasoning is made in natural or conditioned environment, the different times are related to the size of the sausage (longer for salami larger).

3.5.6 Guidelines for the preparation of whole and aging meat muscle

Traditionally, the processing of dried muscle products (Hams, Capocollo, Lonza, Culatelli) consists of the following basic phases: a) the salting phase, in which salt is applied to the surface of the muscle and the temperature is maintained at low temperature (e.g. 2 - 4°C) b) the resting phase, in which salt is distributed uniformly or equalises throughout the muscle and temperature continues to be maintained at a low level c) the drying and maturation phase, in which a gradual increase of temperature brings about a lowering of the moisture content of the muscle allowing for maturation. The duration of the third phase and final phase is highly variable (between 3 and 20 months) and determines the desired type of product.

Microbiological stabilisation is achieved with concentrations of sodium chloride below 4.5 to 5%, while the a_w should also be less than 0.96 (resting phase). Only when these conditions are met should the muscle be passed from the salting phase, where the temperature is less than 4°C, to the drying phase, where the temperature is gradually increased (18-20 °C).

1 Receipt and raw materials section

The muscles are selected, sorted and stored properly. This can be done both instrumental measurements (weight, temperature, pH, etc..) and sensory evaluations on the quality of meat and fat and hygienic conditions. The operation is normally performed at relatively low temperatures (<12 ° C) only during the winter and in unheated rooms. Preventive measures must be commensurate with operating conditions.

2 Storage and refrigeration

The muscles are stored at temperature of refrigeration, observing ap-

propriate standards to prevent pollution side (avoiding contact with walls, other raw materials and finished products) and ensuring adequate air circulation.

3 Cleaning

The muscles are prepared for the salting process by removing parts (connective tissue, excessive fat) that would determine to be non-penetrating of the salt and the unsuccessfulness of the product.

4 Cooling

The muscles are cooled to obtain the correct consistency and the right temperature for salting. The raw meat is stored at temperatures of refrigeration, observing appropriate standards to prevent unwanted contamination (contact with walls, other raw materials and finished products) and ensuring adequate air circulation.

5 Salting

Cover the muscle with sea salt and place it on the floor or a container slightly inclined. The salting period is one day or 1.5 days per weight of muscle. Keep the muscle in a cold room at a temperature between 2 – 4 °C. Then wash with warm water and a little wine or vinegar.

6 Resting

Place the products released by salt at low temperature to undergo good dehydration . The main objective to be achieved at this stage is the loss of moisture (for hams the weight loss is between 13 and 15%). The resting time depends on various factors, a time between 30 and 90 days ensures a good distribution of salt.

7 Washing-Drying

Washing with warm water or brushing is intended to remove surface deposits of various kinds. After washing, drying the product to remove excess water.

8 Ripening

The aging in traditional or conditional room's permits a gradual decrease in a_w and the incurring of the final features. The aging varies between 3 and 20 months depending on the type of product (typology of muscle, weight). The temperature of the room is between 16 and 20° C and the humidity 65-85%.

3.5.7 Identification of good practices

1. Register of good practices (hygiene, clean clothes) made by workers at the end of the workday.
2. Control of the good running of the facilities and equipment prior to the beginning of the activity and register of any faults.
3. Implementation of quality standards ISO 9001 and ISO 22000 to add new value to the product in subject of Food Safety.
4. Reuse of the salt used in salting stage.
5. Application of lard on the ham surface to prevent the proliferation of mites.
6. Development of a plan for total traceability: from the origin, in the field: field inspection certificate for animals, disinfection certificate of the vehicle that brings them to the slaughter, etc.; until the exit of the final product (marking, labelling).
7. Register of seized pieces not suitable to be covered within the Denomination of Origin.
8. Permanent monitoring of all pieces from the salting stage until their ripening, controlling moisture and temperature thoroughly, and control of organoleptic quality of the final product.
9. Requirement for all workers to be in possession of food handler certificates.
10. Requirement for suppliers to keep track of all the ingredients provided.

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4. Improvement and valorisation of typical meat products of the Med area

4.1 Transfer of technical knowledge

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Training activities

The training interventions must be organic and integrated using seminars, internships, and moments of training with coaching by experienced staff, presenting and producing information properly prepared on the food management, health management and production techniques, meetings of partnership to illustrate the different issues and what innovations have been introduced.

The training plans should be supported by actions of corporate planning, aimed at the creation of a regional training system continuously attended by firms operators, craft associations, experts from local government.

The seminars have been locally organised by each partner for breeders and transformers and foresee different content depending on the characteristics emerged by analysis of Component 3.5 "gap assessment and work plan for valorising the production".

Italy

The training plan included the following modes of operation :

- Emilia Romagna, Sicily: basic training courses on parasitic and infect diseases, sustainable breeding systems, the characteristics of the mixtures, the processing technology and the characteristics of the ripened products.
- Tuscany: advanced training courses relating to sustainable breeding systems, innovations in processing and final characteristics of the products .

For all regional situations should be introduced testing of sensory evaluation of ripened products with the goal of identifying differentiated quality standards.

SSICA (Emilia Romagna) organized in collaboration with Consorzium Parma Black Pig under the title of "Parma Black Pig : Breeding and Transformation" a training session about good breeding and processing practices. Breeders, meat processors and professional working on zootechnical field were invited to attend.

The meeting was opened by the Province Vice-President P.L. Ferrari, who has added many efforts have already been made to enhance the Black Pig, but there are still many goals to achieve; it would be necessary to consolidate the number of animals, otherwise everything would have been done so far to little. The meeting continued with the round table "Experience and common territorial cooperation" with the participation of V. Pruiti (Sicily Region), M. Bonanzinga (Tuscany Region), E. Gabbi (Consortium Parma Black Pig), C. Dacci (Consortium Mora Romagnola), A. Sabbioni (Parma University), C. Diaferia (SSICA) in which several cases were presented for the promotion of indigenous pig breeds.

It was also presented the video "The Parma Black Pig: breeding and processing" by Marco Epifani.

Picture 11 - Seminar Parma Black Pig: Breeding and Transformation

SSICA also organized another training seminar focused on good practices and local experiences of the Parma Black Pig and Mora Romagnola Pig. During the training seminar, different technical aspects were covered: principles of feed and diet, technique of preparation of cured meat products, traceability chain. The seminars finished with a sensorial evaluation of cured meat products obtained from Parma Black Pig and Mora Romagnola Pig.

Picture 12 - Typical Salumi from Parma Black Pig

Picture 13 - Typical Salumi from Mora Romagnola Pig

Tuscany Region organized with the support of the University of Florence Department of Agricultural Biotechnology, Section Animal Sciences, different technical meetings to exchange experiences and innovations. Three local seminars repeated in three different areas of the Region for the dissemination of good practices in the rearing phase and in particular management techniques to improve the reproductive phase, management and grazing animals in order to reduce variability and shorten the period of reaching slaughter weight, rationalization of the practice of grazing in the forest as a function of environmental sustainability, animal welfare and product quality. A regional seminar for the dissemination of good practices related to the transformation of meat products. In the regional seminar were presented the results of the "analysis and evaluation of the context" and were illustrated the subsequent transfer of innovative activity and exchange of experiences and the realisation of initiatives for the enhancement of production of the same programming provided by the Component 4 "Improvement and valorisation of the production and distribution chain of typical products" (regional seminars, panel sessions, testing, evaluation of the technical sessions of maturation in relation to the quality of the products) and specifically the production of ham, salami and capocollo; presentation of the results of panel test sessions made by the Consortium of Cinta Senese, in the implementation of Action 4.2, regarding the evaluation organoleptic quality of the products (ham, salami and capocollo); evaluation of the critical phase during the processing and marketing of products of Cinta Senese and discussion of possible development strategies.

Picture 14 - Images of the delegates attending the training seminar – Tuscany Region

Picture 15 - Traditional ham of Cinta Senese swine

The Sicily Region with the cooperation of the Sicily's Experimental Zoo Prophylatic Institute, technicians SOAT organized informative seminars directed to farmers and technicians who have addressed the following topics: parasitic and infect diseases, well-being and different typology of breeding of Nebrodi black Pig, management of Health Nebrodi Black Pig, sustainable breeding systems of natural species, nutrition management of natural resources to guarantee quality of meat, protection of native species as factor of local development, techniques of seasoning in the preparation of Nebrodi salumi. The activity made allowed to update the knowledge framework for identifying the good husbandry and manufacture practices.

Picture 16 - Traditional Nebrodi products (ham and salami)

Spain

AINIA organized a seminar on farm and territorial features in Requena region. The main objectives of the seminar were to show producers and farmers the territorial features and to explain them some sustainable practices. The production of PGI Requena products is conducted with a craft technique that uses for seasoning traditional locals and low levels of production. Characteristic of the salami manufacture is the use of spices/flavourings from the region (dried fruits, fresh orange, juice, olive oil). The main technical aspects shown during the seminar were the territorial features and particularities of Requena Region, traditional breed recovering, and sustainable practices for waste management, energy production. Speakers gave to the audience fist hand information and at the end the attendees had the opportunity to ask questions to the experts (AINIA and Polytechnic University of Valencia).

As result of the seminar, the speakers identified some technical needs from the attendees.

Concerning the production of Iberian ham and in particular of Los Pedroches ham (Cordoba area), experts from La Dehesa explained how they produce the pigs paying special attention to those characteristics that make Iberian ham different from other varieties in Spain. Technology experts explained the most relevant technologies used in the farms with the aim of assuring the breed along the entire food chain. Moreover, they showed how

the "cure" process is done in this particular area. In the evening a visit to a "Dehesa" (typical farm) and to industry were organized. Italian partners and the rest of attendees could see how farmers produce the pigs and how the industry works to produce the Iberian ham. The most important result from the seminar was the exchange of knowledge among the attendees. The ham production in Cordoba region is completely different from the way it is done in Sicily regions and Parma area. Speakers had the opportunity of exchanging their knowledge and learnt new methodologies.

France

The Drôme Chamber of Agriculture organized the seminar regarding how transfer the production techniques and how improve the production of typical products. The purpose of the Selection of Grise du Vercors poultry was to improve the homogeneity of the batches of birds and to improve Daily Average Gain (DAG) while preserving specific taste qualities. Consequently, the main objective was to transfer the genetic knowledge acquired at the Béchanne (Rhone Alpes) selection centre to the poultry breeders.

Following on from earlier technology transfer activities, Drôme Chamber of Agriculture will implement two types of training seminars:

1. Technical conferences to pass on results and recommendations concerning technical itineraries suited to Old Breeds of Poultry (local feed to develop the specific organoleptic qualities of the products).
2. Training seminar to target and provide information on the specific organoleptic and taste characteristics of old breeds.

It aims to "preserve food heritage, promote the quality of food products and improve the production of typical products".

The Drome organized training days on the characteristic organoleptic and taste qualities of old breeds of poultry. The aim of the course is to train a sensory panel of poultry from the race former industry players so that they are able to characterize and differentiate products.

Picture 17 - Drôme Chamber of Agriculture: Tasting Panel

The situation of Corsica is similar to the Italian but with a greater fragmentation of firms of household type with some pigs to be transformed for each farm. The process of transformation takes place mainly in natural rooms.

Training plan provided training interventions at basic level with special attention to hygienic issues and to process conditions.

Greece

The data of the GAP analysis do not allow a general assessment of the Greek situation on the breeding and manufacturing/ processing of pig meat native. In particular, alongside products of the central European country there is a Greek typical product (Trikalian sausage) derived from meat of black pigs.

Picture 18 - Traditional Trikalian sausage

INA CERTH organized in the Conference Center "Nikolaos Germanos" of the International Exhibition of Thessaloniki (February the 5th, at 18.00 pm) a seminar for the presentation of project results to the involved organizations and businesses. The event also was supported by meetings between stakeholders, pig producers, producer associations and scientific bodies, with emphasis on breeding and production of meat.

The event was moderated by Dr. Anagnostis Argyriou, researcher at INA/ CERTH and scientific director of the project where he presented the results and experiences gained so far during the implementation of the project.

The event was attended by pig farmers and agronomists from the region of Central Macedonia. Production processes, environmental issues, product handling and pig breeding, as applied by other partners involved in the project (Sicily, Parma, Corsica, Cordoba) were presented, as well as the potential adoption of these techniques by pig farmers of Central Macedonia.

There was a significant presence in the event, this of Mr. Dimitris Dimou, who according to the results of research conducted under in the framework of the QUBIC project, owns the only farm in Greece where a homogeneous population of the Greek breed of black pig can be found. Mr. Dimou stressed the need for regular communication of the few remaining pig farmers and encouraged the creation of partnerships between stakeholders across the chain, from farming stage, through slaughtering, processing, preparation, towards

the distribution of black pig products, which have important qualitative advantages.

The event ended with the suggestion to repeat a similar event among pig farmers and other stakeholders in the chain of processing and handling of meat products from indigenous tribes to get proposals for strengthening entrepreneurship in the industry.

Thanks to the different actions carried out the SMEs have shared know-how about good practices regarding breeding, production, marketing and even use or consumption of the products within and outside the production area.

4.2 Networking events for the exchange of experiences

Jorge Molina and Mª Paz Villalba - AINIA

Tradition and territory features result in different techniques and ways of producing and distributing cured meat products. Every Mediterranean area participating in the project has specific production processes and uses different techniques to produce traditional cured meat products. For these reasons the project aims to organize forums where all stakeholders take the opportunity to share its experience and know-how on the field

It was foreseen to celebrate an international networking event. Networking activities make possible the direct contact among different stakeholders reason why some additional events were organized.

Qubic partners participated and hold different national networking events. The ones organized by partners took into consideration the profiles of the attendees and the one of the aims of the project, to preserve the traditional way of elaborating cured meat products.

AINIA organized two events, one in Requena region and one in Cordoba area. All of them were prepared taking into account the main objective of this kind of events, to make possible the networking among the attendees (farmers, producers and research centres among other). Moreover, it was recorded a video that shows how cured meat products are traditionally elaborated in Requena region.

A seminar focus on the improvement and sustainability of traditional cured meat product processing took placed in Requena in November 2010. The topics considered were: Farm and territorial features in Requena region and energy production from farm residues. These two topics were chosen according to the importance for the SMEs working in the region.

The main objectives of the seminar were to show producers and farmers the territorial features and to explain them some sustainable practices. The

main technical aspects shown during the seminar were the territorial features and particularities of Requena Region, traditional breed recovering, and sustainable practices for waste management, energy production.

Picture 19 - Networking seminar about the sustainability production

Speakers gave to the audience first hand information and at the end the attendees had the opportunity to ask questions to the experts (ainia and Polytechnic University of Valencia). Moreover, attendees had the opportunity to share their knowledge and concerns about cured meat elaboration.

As result of the seminar, the speakers identified some technical needs from the attendees.

A seminar and industrial visit was held in Cordoba in March 2011. The main objective of this seminar was to reinforce the Technology Transfer and Good Production Practices Exchange among different partners. Experts from SSICA, Sicily Region, University of Cordoba, Los Pedroches DO and ainia participated in the meeting. Moreover, some farmers and technicians from a research centre attended the meetin seminar.

The seminar was focused mainly on technical information exchange and the presentation of farm and territorial features of Cordoba region to foreign partners.

Experts in the map features presented the most relevant features of the Suino Nero from Sicily Region. Concerning the production of Iberian ham and in particular of Los Pedroches ham, experts from La Dehesa explained how they produce the swine paying special attention to those characteristics that make Iberian ham different from other varieties in Spain. Technology experts explained the most relevant technologies used in the farms with the aim of assuring the breed along the entire food chain. Moreover, they showed how the "cure" process is done in this particular area.

In the evening a visit to a "Dehesa" (typical farm in Cordoba region) and to Iberian ham industry were organized. Italian partners and the rest of attendees could see how farmers produce the pigs and how the industry works to produce the Iberian ham (all the food chain steps).

The most important result from the seminar was the exchange of knowledge among the attendees. The way the ham is produced in Cordoba region is completely different from the way it is done in Sicily and Parma regions. Speakers had the opportunity of exchanging their knowledge and learnt new methodologies.

To disseminate the differences between the traditional cured meat products elaboration and the industrial production, a video was recorded in Requena area. Some Requena´s butchers and technicians from ainia were involved in the recording. The video shows how typical products are made in Requena; the ingredients, the handmade production process and its particularities as well as the climate conditions that make the products different from other regions in Spain.

The Chamber of Agriculture de la Drôme participated in two events with the aim of promoting the main features of their traditionally elaborated products, old breed poultry in the Drôme area.

In July 2010, the chamber participated in the Blue Cheese Fair (Fête du Bleu). Local breeders, restaurants and consumers attended the exhibition that least two days. Some presentations focused on the "Grise du Vercors" production were made with the aim of promoting of this traditional product. A couple of catering companies presented meals with the "Grise du Vercors" chicken demonstrating how to improve a restaurant menu.

Picture 20 - Blue Chees Exhibition. Presentation of "Grise de Vercors" characteristics.

The main results of this event were the promotion and dissemination of the "Grise de Vercors" poultry, the enhancement of industry development and the demonstration of taste qualities of Grise du Vercors Hens to the audience. The event also helps to establish a first contact with some distributors of meat products.

A day of discovery and tasting of old breeds of poultry from Drôme was held by the Chamber of Agriculture de la Drôme in November 2010. The event was address to restaurant operators, traditional businesses, catering companies and Slow Food operators.

It consisted in a visit of a breeding in Pintadeau of the Drôme, a presentation of the Hen Intoxicates (Tints) and a tasting tests of rare waters and local poultry. A special lunch was organized with Pintadeau of the Drôme and Grey of Vercors. At the end of the day a conference about the local products was made; it was focused mainly on gustative and nourishing qualities of the traditional products and on biodiversity, nutrition, health and environment aspects.

Picture 21 - Tasting test. Experts panel assessed the organoleptic features of Pintadeau of the Drôme and Grey of Vercors

Some networking events were carried out in Parma region by SSICA partner.

A seminar focused on the parma black pig breeding and transformation was held in October 2010 in Parma. The title of the seminar was *Progetto*

QUBIC "Educational Activity". With the aim of transfer technical knowledge to breeders and technicians people from SSICA Parma, Agri-eco srl Fontanellato Parma, Sicily Region, Tuscany Region, Parma University, Consortium Parma Black Pig, Consortium Mora Romagnola, Chamber of Commerce Parma and Province Parma participated in the event.

Picture 22 - Flyer of the event organized by SSICA

All the stakeholders participating had the opportunity of meet each other and exchange technical knowledge about the different techniques and methodologies used in the traditional breeding and production.

Picture 23 - Presentation of QUBIC project in the event

A local networking event was organized in July 2011 in Parma. The main aim of the event was to support SMEs development by the transfer of technology and production knowledge and the promotion of establishing

partnership among operators.Breeders, Professionals and other Stakeholders attended the event.

The event consisted in a bilateral meetings that included an Educational visit to Breeding farm "Società Agricola San Paolo" Medesano (Parma) and to Educational visit to Meat Products laboratory – Langhirano (Parma).

Sicily Region organized two events with the aim of supporting local SMEs and to promote the networking among them and other stakeholders.

One day training session titled "Analysis of the production of the Nebrody Black Pig – Presentation of the activities related to the transfer of innovations and the valorisation of production" was held in November 2010. Local breeders, technicians and professionals attended the session.

It was focused on processing technology used in the elaboration of Nebrodi´s cured meat and on chemical-physical and microbiological characteristics of this kind ofg products. Salting, tanning and filling technologies through the use of inocula of native bacteria were presented as well.

The participation in the event was very active and a large number of breeders, technicians and professionals took part in the event. Operators of different phases of the chain exchanged opinions and provided their knowledge, taking advantages of the existing differences in terms of experiences. Furthermore, during the event, operators made a contact in order to create a sale network of local products.

Other event organized by Sicily Region was focused on the biodiversity of swine of the MED area, a comparison among them. The event was addressed to operators of the supply chain and stakeholders in the regions covered by QUBIC project. National policy makers, producers associations and coops, small producers and farmers, distribution representatives and researchers involved in the projects attended the event.

It took place in Sant'Agata di Militello in April 2011. The event lasted two days.

During the first day, participants made a guided tour of two salami factories in the Nebrodi, named "Starvaggi Michele and Salumi Sant'Angelo". Then, they visited the Nebrodi Experimental Centre of Galati Mamertino, where there was a lunch based on typical swine products, and a swine farm in the Nebrodi territory, named "Azienda Borrello".

In the afternoon, a panel test on cured meat products of partners'areas was made.

During the second day, after the greeting of Mr. Mancuso, mayor of Sant'Agata di Militello, Mr. Spartà, coordinator of the QUBIC project, moderated a roundtable about native mediterranean breeds. In the roundtable participated several representatives of associations: Black Pig of Nebrodi, Black Pig of Parma, Mora Romagnola, Greek Pig, Iberic Pig, Nustrale Breed, Cinta Senese.

Then, typical swine products of the Med area was presented.

After lunch, the Hon. D'Antrassi – Regional Councillor for the Agricolture Department, and the Prof. Barbagallo – Chief of the "Department of Infrastructural Projects in Agricolture", brought their greeting to the participants. Then, every partner of the Qubic project presented the features of breedings and productions related to their area. Particularly, the breeders set up some stands and presented their typical products and publicity material.

Several stakeholders from all partner's regions participated to the transnational event. It resulted in a link among operators and SME's of different regions of MED area was created. The SME's will use this link in order to increase their competitiveness in the MED area and to improve territorial cooperation. The breeders liked the event, so that they send many notes of appreciation to lead region.

Picture 24 - Transnational Event in Sicily

Tuscany Region organized some networking actions in collaboration with the Consortium of La Cinta. All the activities carried out had the same objective, to disseminate the traditional products and enhance its commercialization to preserve the breeding and production.

Four events were organized to evaluate the organoleptic properties and quality of products Cinta. Different tests were carried out with the expert panel established by the Province of Siena and recognized by the Region of Tuscany. These sessions took place in October-November 2010. A total of 39 operators participated in these sessions.

Picture 25 - Panel test members during the sessions

Picture 26 - Preparation of salami for its test

The quality evaluation of various products resulted in the identification of the main strengths and weaknesses in relation to the different techniques of processing and curing. Moreover, these sessions provided with useful information to operators what will help them to improve the phase of meat processing

In the regional exhibition EXPO RURALE 2011 in September 2011, a stand was presented to disseminate the traditional cured meat products of Cinta Senese. Moreover, two project presentations were done and followed by a guided tasting of the products of the Cinta Senese pig.

The participation in the exhibition made possible the dissemination of the difficulties in the preservation of Cinta Senese pigs and the problems related to the preservation and development of indigenous breeds. Furthermore, it was a opportunity to show the attendees (mainly general audience) the organoleptic qualities of meat products of Cinta Senese.

Picture 27 - Tasting of products of Cinta Senese

The partner INRA organized one day exchanges addressed to breeders, technicians and professionals. The event was focused on processing technology, chemical, physical and microbiological characteristics of Nebrodi's cured meat products; salting, tanning and filling technologies through the use of inocula of native bacteria. It took place in July 2011 and a total of 47 operators participated.

This event has gathered a great part of the breeders involved into the management of the Nustrale breed. Animals of the breed have been presented and some of them were proposed to sell. A degustation of *prisutti* issued from the several experiments of finishing periods allowed the participants to share their feelings about the main factors to be considered in the future PDO specification.

4.3 Support to SMEs development

Mari Paz Villalba Talens and Noemi Vidal - AINIA

The SMEs need to strengthen their innovation capacity and their contribution to the development of new products, as well as to promote their products to broaden market opportunities.

Within the framework of this action, different activities have been carried out for the benefit of SMEs. Particularly, these activities have been focused on organizing bilateral meetings between SMEs from several regions and within the same region, in order to enhance their innovation capacity and competitiveness by mean of transfer of know how as well as promote partnership building.

Other activities addressed to give support to SMEs have been the promotion and dissemination, of the principal features of the traditional cured-meat products.

Particularly, in the Valencian region a training seminar dealing with the improvement of traditional cured meat products processing was held. The event took place in Requena (Valencia) with an attendance of 15 traditional cured meat products processors. During the seminar session it was possible to transfer technological information about the use of natural additives, amongst others. In particular, three experts from an Ingredients Company, the University of Seville and from ainia, explained the technological role of additives, the use of resveratrol (natural antioxidant) and salt reduction in cured meat products, respectively.

The main result achieved after the session finished was the improvement of knowledge by the processors on the use of additives in cured-meat products processing, getting to know more about alternatives to the ones they usually use.

Picture 28 - Image of the delegates attending the training seminar and traditional meat products from Requena

The seminar was published on digital press, Tecnoalimentalia and in Agromeat.

Moreover, within this action during an Exhibition of traditional cured-meat products "XVIII Muestra del Embutido Artesano y de calidad" ("XVIII Exhibition of High quality traditional cured-meat products"), held in March 2011, the different processors were informed about the benefits of the present project. There was a direct contact with all processors, and explained how the project could give them support through the use of e-commerce as well as how the project would help them in the promotion of their products.

To sum up, this event helped to promote the QUBIC project as a tool for the SMEs to obtain information that may help them on their daily activities.

Picture 29 - Different images showing the promotional information of the Requena exhibition, leaflet with information of QUBIC project nearby traditional food products and traditional cured meat products

The exhibition event was published on digital and on paper regional journal (Las Provincias), on the 3rd of March 2011.

Other activities carried out in the context of this action, were carried out in Italy being organized by the partner SSICA and Tuscany Region.

The seminar organized by SSICA in collaboration with "il Consorzio del Suino della Mora Romagnola", under the title of **"**Training session about Good breeding and processing practices of Mora Romagnola Swine" was carried out in Brisighella. Breeders, meat processors and professionals working on zootecnic field from the Region were invited to attend.

Picture 30 - Culatello from Mora Romagnola swine

During the training seminar, different technical aspects were covered as well as visits to innovative breeders. It finished with a sensorial evaluation of cured meat products obtained from Mora Romagnola swine.

As a result of this training seminar, the delegates representing different SMEs were able to improve their innovation and competitiveness capacities.

Picture 31 - Mora Romagnola swine and Nero of Parma swine

SSICA also organized the 1st of July, another training seminar focused on Nero swine from Parma. Different SMEs coming from Spain, Sicilia Region, Corsica, Tuscany Region and Greece together with partners of the QUBIC consortium attended this event.

During this seminar, there was an educational visit to Breeding farm in "Società Agricola San Paolo "Medesano (Parma), a visit to the meat products pilot plat in SSICA and a sensorial evaluation of cured meat products elaborated from traditional cured meat products coming from Parma region, as well as other regions where the partners of the Qubic consortium belong to.

This event was announced in www.agriparma.it

Finally, it is important to highlight that this event allowed SMEs from different countries, to establish bilateral meetings and exchange relevant information to give support to each others on their work.

As for the partner from Tuscany Region, with the support of the University of Florence Department of Agricultural Biotechnology, Section Animal Sciences, different business meetings to exchange experiences and innovations, were carried out.

Thus, six business meetings have been made of which:

- four in farms on the exchange of experiences and innovations on the management of the rearing phase to improve the quality of products
- two in processing companies for the exchange of experiences and innovations on the management of the phase transformation and enhancement of production for the development of new markets.

The choice of companies was made by University of Florence in the following ways:

Farmers participating in the seminars organized in the implementation of action 4.1 have been asked to indicate their interest to participate in company meetings to exchange experiences and innovations on the aspects of farm management and the level of processing;

In the month of May the farmers who had been involved on the third component were contacted by e-mail and telephone and even these farmers were asked if they were interested in participating in such business meetings. On the basis of reports received business meetings have been organized.

The meetings, organized on the farms (Cinta Senese) and processing companies saw good participation by stockholders and the following issues have been widely debated:

a) food management;
b) the stage of reproduction;
c) health management;
d) the techniques of transformation;
f) marketing management.

Picture 32 - Cinta Senese swine

Researchers of the Department of Agricultural Biotechnology, University of Florence have mediated the discussion and provided information material regarding the farm survey and good management practices developed with the project Qubic.

All the meetings have had an extensive discussion and above all a useful exchange of information among those present. The debate has contributed and will contribute to enrich the basic knowledge of farmers and processors in order to improve the productive and commercial aspects of sector.

The meetings dealt with different technical aspects, covering each of the stages of the food chain. Thus, it was carried out discussions of production of Cinta Senese race (crossbreed, mixed race, management of reproduction, links between the product to the territory, manage-

ment of feeding phase), also issues about nutrition and breeding techniques in order to improve both productive and reproductive performance, and product quality, fresh and processed as well as marketing of products.

The results achieved after carrying out the different meetings, could be summarize as follows: breeders have been able to exchange experiences on the management of the feeding phase in order to identify the most suitable strategies to meet the nutritional needs of animals ensuring the quality of products and the economic reward of the breeder, also an exchange of different business strategies in relation to the different quality characteristics of products. Regarding product quality, after some discussion they were concerned about the opportunity of decreasing the percentage of salt added to ham processing to comply with current health claims. The crux of the system remains, as emerged from QUBIC survey, in the fact that there exists variability of the raw material, the techniques of seasoning and, consequently in the quality of products.

Other important result to highlight is the fact that the participants agreed on the need to develop a stronger action by the Consortium, in political marketing and promotion of Cinta Senese products on the market at regional and national level.

To sum up the support activities carried out by Tuscany Region, indicate that the farmers agreed on the need to develop common goals in order to reach a critical mass of recognizable product to present market. On this issue, the Consortium of Cinta Senese can play an important role in the development of this common strategy.

And finally, the partner "Chambre d'Agriculture du Drôme" carried out four training seminars, two for sector of Drôme Guinea Poult and two for sector of Grey of Vecors.

Thus, the two seminars for the Drôme Guinea Poult were given under the following titles: "Writing of the PDO file" and "Support development through promotion and marketing actions"

For the first one, the event was addressed to breeders, slaughtering and Syndicate of Drôme Guinea Poult. Within this seminar, different meetings were held among the partners attending and an engineering consultant specialized in PDO initiatives gave them assessment.

As for the second one, the event was addressed to Syndicate of Drôme Guinea Poult, factories of conception, duplication and manufacturing. This seminar dealt with elaboration and duplication of recipes

based on cooking with Drôme Guinea Poult, as well as the elaboration and manufacturing of Drôme of Guinea Poult which were installed along main roads of Drôme.

The other two Seminars addressed to sector of Grey of Vecors, were given under the following titles: "Realization of specific labels to indentify the Grey of Vecors " and "Organization of a study trip concerning Gascogne (another old and local breed of poultry)"

Within the first seminar, different meetings between different breeders and factories were held in order to choose the best proposals for developing promotion tools, such as labels. And for the second one, a study visit was carried out with visits to farms, meetings with partners of the sector, and it finished with tasting products of old breeders of poultries.

The results achieved thanks to the different seminars carried out, can be summarize as follows: it was allowed to better differentiate and valuate products containing PDO of Drôme Guinea Poult, as well as increasing the capacity to find new markets, it helped to improve the name and the image of Drôme Guinea Poult and the promotion of the products, reflected in the sales increase. And finally, it helped to better promote Grey of Vercors, and as it happened with Drôme Guinea Poult the sales increased as well as the number of breeders.

Finally, we can indicate that thanks to the different activities carried out within "Support to SMEs action" by different QUBIC consortium partners, SMEs have received information/support within several areas, breeding, processing as well as marketing helping them to improve their competitiveness.

In Corsica, the support to SMEs has been organized around the main questions identified during the first stage of the work. According to the diagnosis made in the beginning of the project, good practices in Corsican situation are first of all focussing on the raw material quality. Pigs must be reared according to the traditional techniques, with a large part of natural feeding as pigs are pasturing in forestland. A key period is the finishing period with chestnuts and acorns that confers to the pork meat and fat their typical characteristics. The processing practices are very simple but not really controlled by the processors, in particular for the salting process and the curing stage.

A Three-fold activity has been conducted:

1 - Raw material assessment at slaughter stage.

Sampling at slaughter have been realized in order to distinguish the various types of finishing diet. In addition ot the measurement of pH

and colour, we analyzed the content in Intramuscular fat (>6%) and Oleic acid (>47%) in the subcutaneous fat. Thanks to such analysis, the PDO control plan could be more accurate.

2 - Control of salt penetration and concentration.
A main issue for homogenizing the final products is the control of salt penetration, in particular for the *prisuttu*. The check of salt content (2 techniques / traditional one and improved one) has been proposed by bone sondage.

3 - Monitoring of product evolution during ageing.
After drying (weight loss >25%), PDO specification are requiring natural methods for ageing with some limits of temperature (<20°C) and hygrometry (>60%). The INRA unit organized the check of the cells to be used for long ageing.

Participation to a new project of collective processing plant

Beyond the initiative from the PDO applicant, some people have been involved such as ADIV (French technical agency), Chambers of Agriculture, ODARC. In this project, INRA participation has concerned an expertise on several explored solutions for:

- (i) gathering the carcasses produced by breeders and cutting pieces before return to the farmers.
- (ii) processing pieces directly into Prisutti, Coppe and Lonzi according to the requirements of the PDO application (with long ageing in an adapted cell).

Expected results are the provision of new solution for facing the sanitary and technical requirements for valorizing the Nustrale breed through the PDO. But difficulties are faced to enhance collective action.

4.4 Realisation of different seasoning techniques

Giuseppe Spartà, Vanessa Dioguardi, Giuseppa Gaeta, Alessandro Lazzara, Vincenzo Pruiti Ciarello, Antonio Virzì – Sicily Region

In the context of this action, the partners realized local experimental sessions on seasoning techniques, training courses for local operators etc. Particularly, the objective was the transfer of knowledge and innovation about the seasoning techniques in order to obtain typical cured meat of quality and to improve the competitiveness of the local breeders.

The partners adapted the type of event according to the needs and the

features of their territories, in order to make more profits from the actions carried out.

Particularly, the Sicily Region realized a seminar attended by about 60 local breeders. With the help of two experts, it was possible to transfer knowledge and innovation about the techniques to use in order to obtain the typical cured meat requested by the market: capocollo, bacon, salami, ham.

In order to maintain a coherent training path, the seminar was held at the Experimental Zooprophilaptic Institute of Galati Mamertino (Messina), where previous seminars were held.

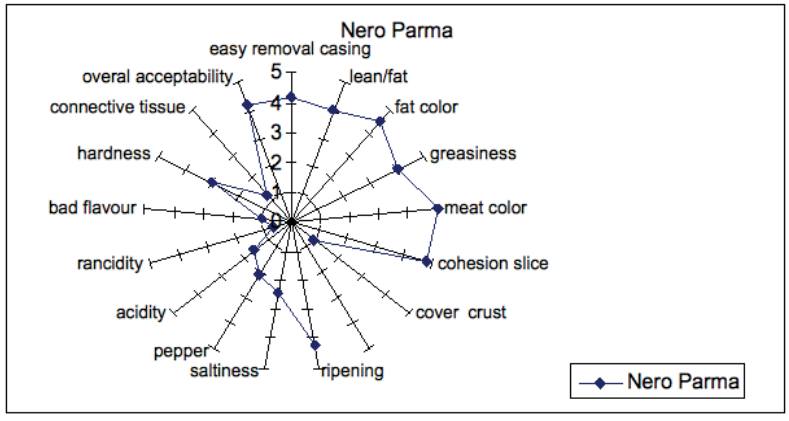
The seminar allowed both to develop the relationship between the experts and the breeders and to increase the interest of breeders about the processing of the raw meat.

The partner SSICA organized two seminars:

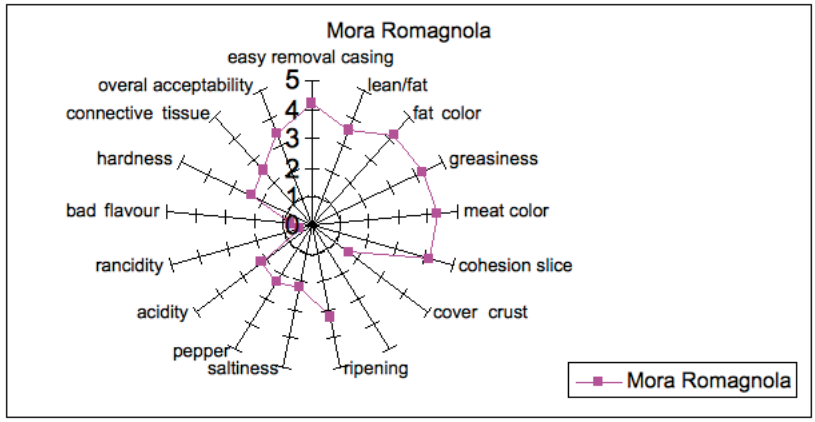
– Seminar on good breeding and transformation practices of the Parma Black Pig attended by 11 participants;
– Seminar on good breeding and transformation practices of the Parma Black Pig attended by 11 participants;

The main results achieved during the seminars are below:

Graphic 22 - Sensory Profile of Salame Nero di Parma (SSICA)



Graphic 23 - Sensory Profile of Salame Mora Romagnola (SSICA)



Tab. 17 - Salami Nero of Parma and Mora Romagnola (SSICA): analytical values (g/100g) of mixture and final product

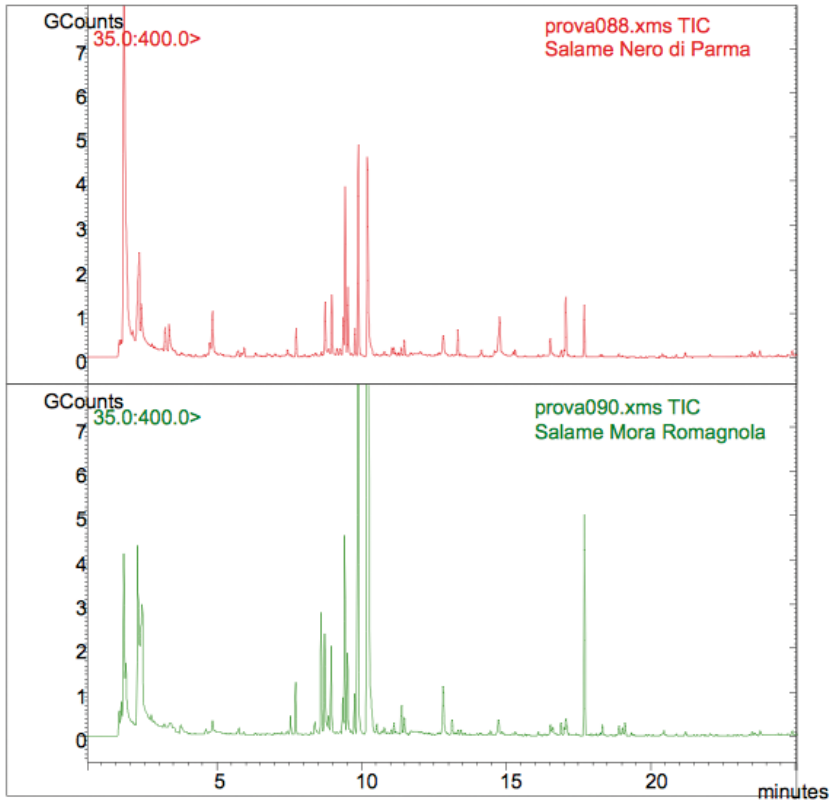
Salami	Water in	Water fin	Salt in	Salt fin	Fat in	Fat fin
Nero di Parma	57.10	29.80	2.3	4.90	19.02	32.70
Mora Romagnola	50.07	30.00	2.2	4.02	25.00	36.00

Tab. 18 - Fatty Acid composition in Salami Nero of Parma and Mora Romagnola (SSICA)

Tipologia di salame	*Nero di Parma*	*Mora Romagnola*
Fatty Acid (g/100g fat)		
AC. Caproico C6:0	*0,05*	*0,11*
AC. Caprilico C8:0	*0,06*	*0,12*
AC. Caprico C10:0	*0,04*	*0,05*
AC. Laurico C12:0	*0,002*	*0,17*
AC. Miristico C14:0	*0,53*	*0,63*
AC. Palmitico C16:0	*9,15*	*10,98*
AC. Stearico C18:0	*4,09*	*6,35*
AC. Arachidico C20:0	*0,07*	*0,09*
Ac. Grassi SaturiTotali	***13.99***	***18.50***
AC Palmitoleico C16:1	*0,91*	*0,81*
AC Oleico C18:1 cis 9	*14,28*	*16,73*
C22:1 w 11	*0,02*	*0,03*
Ac Grassi Monoinsaturi Totali	***15.21***	***17.57***
AC.Linoleico C18:2 w 6	*0,35*	*0,23*
AC Gamma Linoleico C18:3 w 6	*0,07*	*0,09*
AC Linolenico C18:3 w 3	*0,41*	*0,49*
Ac. Grassi Poliinsaturi Totali	***0,83***	***0.81***

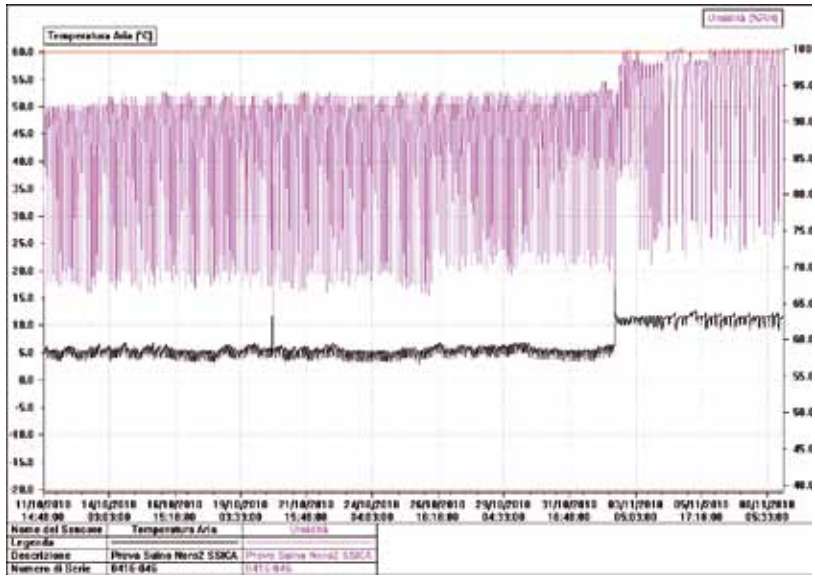
In the following figures are reported the aromatic compounds present in salami: a) the ethyl esters usually present in salami and produced by ossidation of alcohols or by esterification of alcohols and acids that contribute the fruit aroma note of the product; b) linear and aromatic hydrocarbons formed probably during rearrangements of lipid oxidation products. For the salami Nero di Parma, esters, free fatty acids, ethanol and some hydrocarbon compunds are more important than the terpenes present in the salami Mora Romagnola - Thet may also derive from animal but especially from the spices used in the production of sausages in particular from black pepper.

Graphic 24 - Volatile components present in Salami Nero of Parma and Mora Romagnola (SSICA)

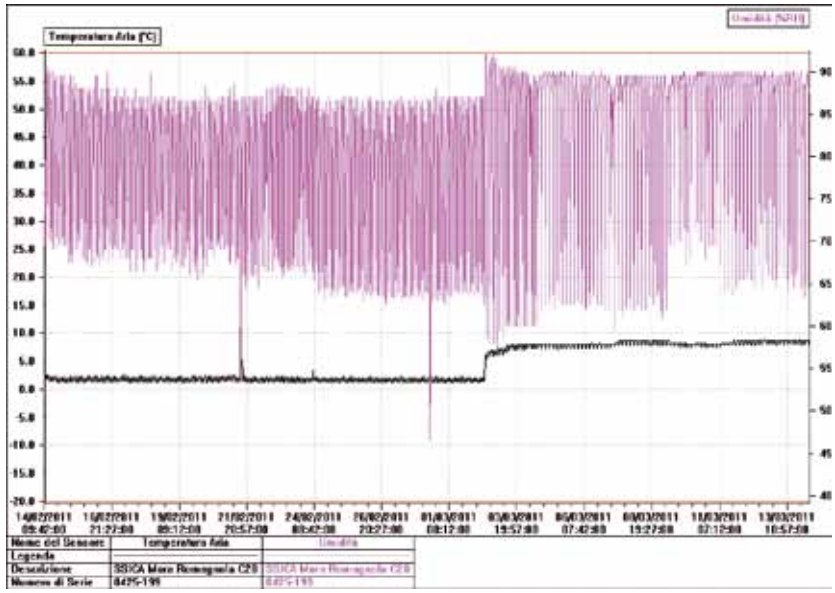


The graphs below show the frend of thermohygrometric parameters in drying and aging.

Graphic 25 - Salame Nero of Parma: Thermohygrometric values (drying and ripening)



Graphic 26 - Salame Mora Romagnola: Thermohygrometric values (drying and ripening)



The results were evaluated positively by the producers who have implemented some technical improvements to get typical and characteristics salami. The products present high nutritional and organoleptic quality standards.

The partner INA CERTH realized two seminars, that is training activities on cured meat products and seasoning techniques focused on the evaluation of the characteristics for the production of the of salami, prosciutto, lonza and coppa from Greek Black Pig.

Picture 33 - Seasoning techniques of Greek Black Pig

During these seminars, the characteristics of Greek Black pig meat for the production of cured meat products were evaluated. A partnership between a breeder and the expert who held the seminars (Stremmenos Enterprise) was established for the production and distribution of cured meat products particularly hammon (named melan akrokolion, see banner below) and salami from Greek black pigs.

Picture 34 - Seasoning techniques of Greek Black Pig

The partner AINIA held technical seminar in Cordoba and visited breeders and industries. The seminar was focused on the production chain of Prosciutto di Parma and on its impact on the territory. Furthermore the state of the art and improvements of Iberian Ham Processing in Spain was shown; it was also discussed about new technologies applied to evaluate Iberian pig meat and Iberian ham products quality and a sensorial test of traditional Iberian swine meat product was made.

Furthermore AINIA is carrying out experimental work on cured

meat products (reduction of sodium content) in the Requena Region. The partner Tuscany Region organized assessment sessions of the products' quality and chemical analysis.

The Tuscany Region has entrusted the implementation of the action 4.4 of the Consortium for the protection of the Cinta Senese in, along with the activity of the 4.2, as activities closely related because both relate the development of products.

The activity on action 4.4 involved the development of 4 training sessions aimed at producer's \ transformers that were held after the holding of sessions of panel tests for assessment of product quality.

The training focused on techniques for evaluating the quality of the products examined by the panel test made in relation to the techniques of seasoning in order to identify major defects related to unsuitable practices of seasoning.

The four sessions were held during October-November 2010 at the conclusion of the panel test sessions on the following dates:

- Tuesday, October 19, 2010 was the first session on evaluation of hams; 12 participating operators;
- Tuesday, October 26, 2010 second session on the evaluation of hams; 10 participating operators;
- Thursday, October 28, 2010 third session on the evaluation of sausages, 10 participating operators;
- Tuesday, November 2, 2010 fourth session on evaluation of capocollo and salami: 9 participating operators.

Picture 35 - Evaluation session on the hams

Picture 36 - Mr. Pacini expert evaluation of the products (Panel leader)

Participants in the sessions were given an evaluation questionnaire. Elaboration of the questionnaires revealed that 76% is considered sufficiently satisfied with the experience of the sessions and 22% feel very satisfied.

The evaluation sessions opened discussions about techniques for evaluating the organoleptic quality from the explanation of the evaluation of the products. The panel leader presented the results of the evaluation of products and these results were compared with the techniques of seasoning.

Provides a description of the different quality standards of the products presented in training sessions and the results of analytical work performed on the hams.

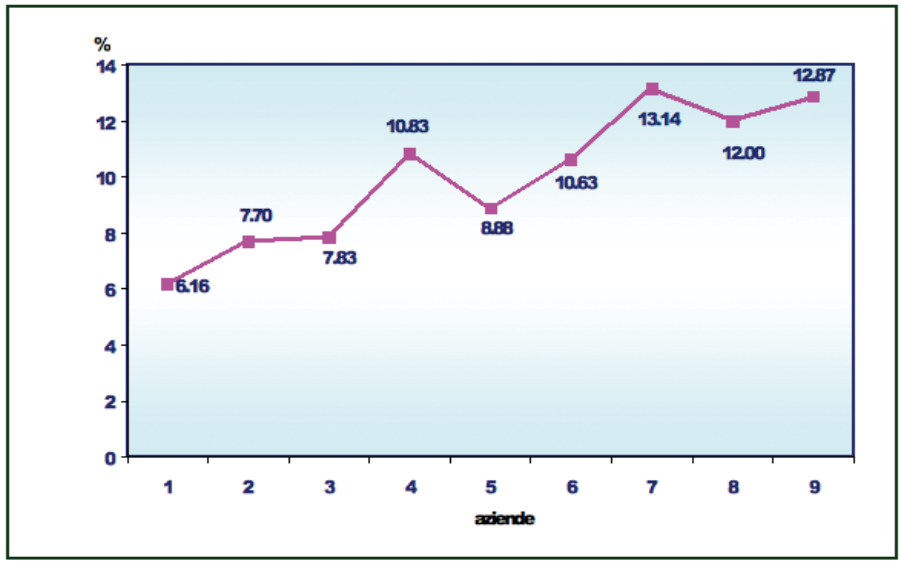
To assess the quality standard of what is considered the main product of the processing industry, the dry-cured ham quality analysis was carried out, of the nine samples of hams subjected to evaluation by panel test.

Were analyzed parameters as follows:

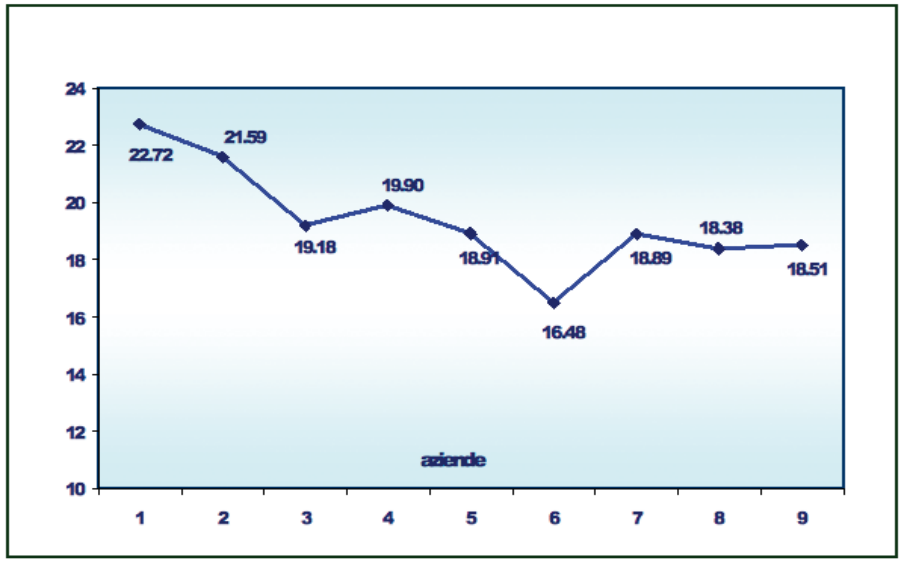
- Percentage of salt;
- Fatty acid composition:
- Index of proteolysis;
- Lean and fat color using colorimeter.

From a general examination of the qualitative results show a high variability for all parameters analyzed, variability that is not always contained within the bounds of acceptability of the product, especially for features such as the percentage of salt.

For the latter (Graphic 27), the range of variability is between the minimum 6.15% and the maximum 12.87%. Six out of nine hams have higher percentages of salt 8.3%, which represents the maximum level expected by the specification of Prosciutto Toscano DOP and therefore too high for a typical product the Tuscan salumi. It should be mentioned that today the general trend is to reduce the content of sodium chloride in foods for the known negative effects of this on human health. The content of salt, the inhibitory effect exerted by this proteolytic enzymes that act during the aging process is closely related to the rate of proteolysis. A comparative analysis of Graphic 27 and 28 it can be seen that the two parameters have an opposite trend. If it is true that include proteolysis, especially in the upper limit and warn the formation of unpleasant aromas, is even more true that proteolysis is too low, a result of high rates of salt, does not allow the complete formation of the pleasant characteristic and aromas.



Graphic 27 - Percentage of salt



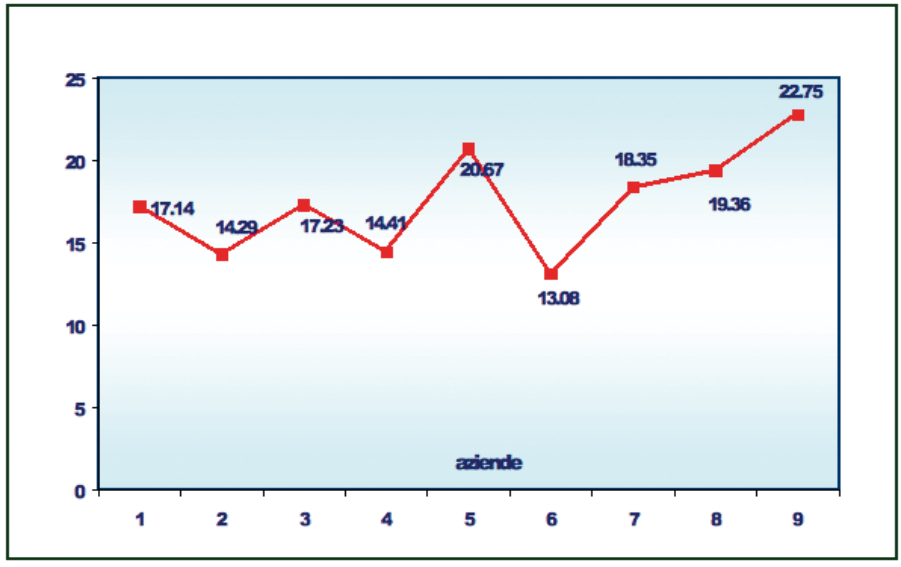
Graphic 28 - Index of proteolysis

The variability of these parameters, percentage of salt and an index of proteolysis, is linked primarily to differences in processing techniques and, to a lesser extent, the variability the qualitative raw material.

As for the color of the muscle used to make the ham (Graphic 29), a high variability is evident, due probably to the techniques and different curing times and also at different ages of slaughter of animals. The direct relationship between age of the animal and intensity of the color of the meat is unknown.

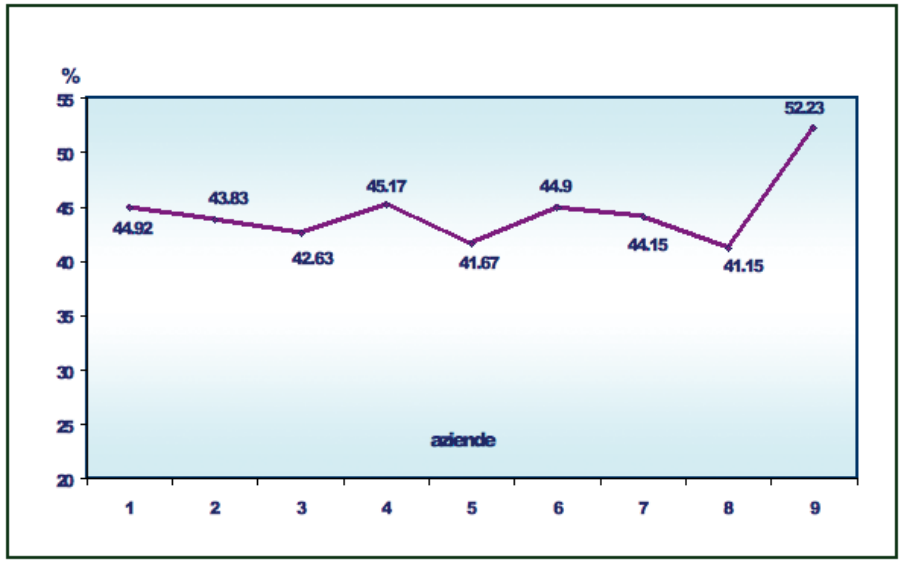
In fact, as the survey data also showed in companies (cap.3.1) the range of weight and age of animals at slaughter, in the Cinta Senese breed companies, is extremely variable, which means, inevitably, a strong variability in raw material.

The fatty acid composition of fat, in terms of percentage of oleic acid, linoleic acid ω 6 and linolenic acid ω 3 (Graphic 30-31-32), oscillates between values large enough.



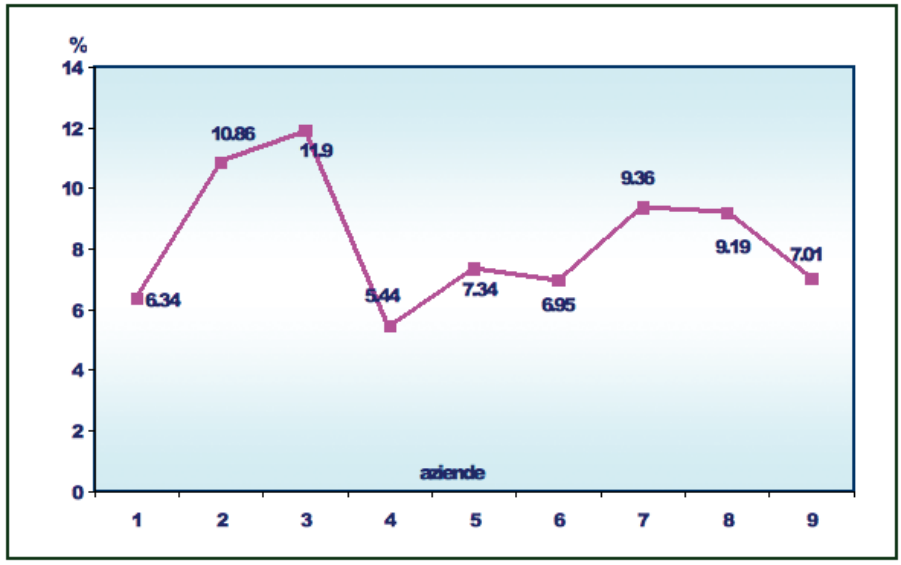
Graphic 29 - Index of the red color of the muscle used for ham

The different types of grazing may in fact direct the fatty acid composition of adipose tissue, the latter being, in swine, a sort of picture of what the animal was like before slaughter.

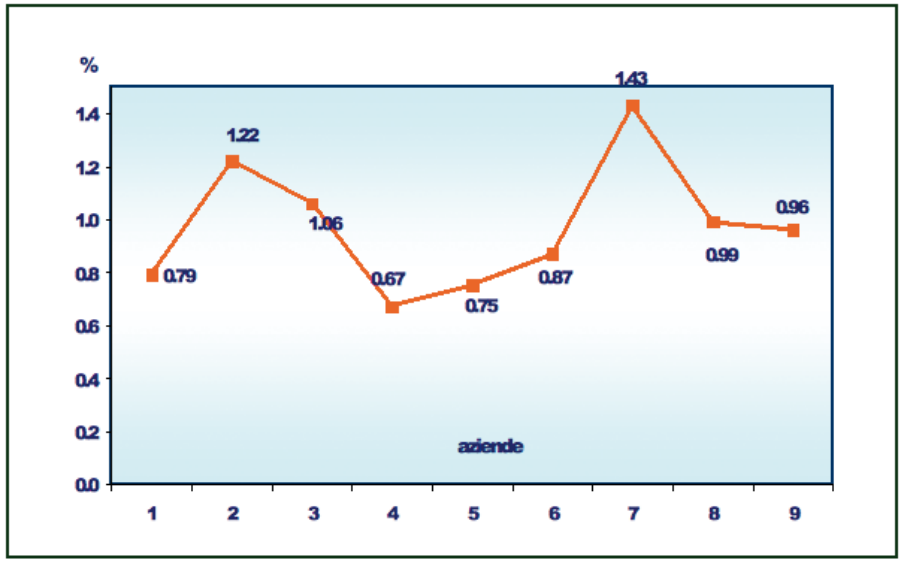


Graphic 30 - Percentage of oleic acid in fat

It is therefore likely that increased levels of polyunsaturated fats (linoleic ω 6 and linolenic ω3), is due to grassy pasture and an increase of oleic acid is the result of acorn consumption and / or chestnut. The variability observed for the fatty acid composition, and in particular oleic acid, may represent an element of characterization of the product, being oleic acid a precursor of favorable aromas. The increase in polyunsaturated fatty acids, if too pronounced, may compromise the quality of the meat technology.



Graphic 31 - Percentage of l linoleic acid (ω – 6) in fat



Graphic 32 - Percentage of linolenic acid (ω – 3) in fat

With regard to the sensory evaluation of the ham, for the parameter of salt, you can highlight the same variability found for the sodium chloride content which is determined chemically. Overall, however, the level of acceptability for this product can be defined as medium / high, the view, for all parameters considered, it has never fallen below the threshold of 5 (with the exception of the flavor of pepper).

The framework for evaluation of the sausage is more complex than that of the ham as it is detected by the sensory evaluation ratings, average discrete but may go down as a minimum value, even below the threshold of 5. This confirms that sausage is a product with high variability and difficult to work. For this product, in addition to the variability of quality raw material, you must add a non-standardized processing technique that isn't normally used in the processing of white pig meats.

Values of friendliness and overall acceptability are not particularly high, there may be even for capocollo.

Picture 37 - Preparation of the product: salami

The following discussion with the operators present at the sessions showed that the raw material, the meat of Cinta Senese, is potentially of high quality but needs to be transformed into quality products, greater standardization and more consistent processing techniques and more responsive to current consumer needs.

Picture 38 - The hams examined in the first evaluation session

Picture 39 - The salami examined in the evaluation session - Tuscany Region

Regarding to the INRA partner, the crucial issue was: how to manage the inspection of breeding activity in order to ensure the respect of the PDO specification? The INRA unit acted in cooperation with SCAC (inspection body) in order to conceive the Control Plan adapted to the local situation. Moreover, a training has been proposed both to the inspectors of the SCAC and to the INAO staff (French public institution in charge of the PDO recognition at national level).

1. Breed is compulsory
   Identification of animals and check of the genealogy is a very important step. The INRA unit is working with the Association in charge of the management of the *Nustrale Pig* breed in order to insure the animal basis in the farms involved on the PDO project.
2. Finishing component is mandatory
   Two options are open:
   - only chestnuts and acorns, considered as the most traditional way. The products could benefit of a special mention within the PDO.
   - chestnuts and acorn during 30 days and barley after, for insuring the possibility to achieve a sufficient weight at slaughter even in case of low production of chestnuts and acorns (production of such natural feeding remains fluctuant). In this case, products are named Corsican but without the special mention.

3. Traceability of both options till the final product
   The INRA unit produced the methods to be used for separate the two options (within the PDO) and the products outside of the PDO. Such work has been dedicated to the conception of documents (proof of the origin) and analytical references (in case of doubt).

Acknowledgements
Special acknowledgements to Carlo Diaferia (SSICA) and Maurizio Bonanzinga (Tuscany Region) for their contribution.

5. The communication strategy

Giuseppe Spartà, Vanessa Dioguardi, Giuseppa Gaeta - Sicily Region

5.1 Introduction

According to the Commission Regulation N° 1828/2006, experience has shown that citizens of the European Union are insufficiently aware of the role played by the Community in funding programmes aimed at reinforcing economic competitiveness, creating jobs and strengthening internal cohesion. It is therefore appropriate to provide for the preparation of a communication plan which identifies in detail the information and publicity measures necessary to bridge this communication and information gap. For the same purpose, it is also necessary to identify the responsibilities and the roles that should be played by each of the actors involved.

Given these considerations, we developed a communication plan, in order to maximize the impact of Qubic project, during both the development period and the end of the activities.

5.2 Communication objectives

The general purpose of the communication plan is to support the strategic objectives of the Qubic project and provide action items related to the communication.

To fulfil the objectives of the several steps of the project, the communication plan was structured around 7 priority objectives which will govern the activities:

1. raising awareness of the benefits of the project;
2. informing beneficiaries of the opportunities provided by the project;
3. capitalising tools and methodologies;
4. disseminating the project results to the whole public;
5. presenting the outputs of the project to the beneficiaries;
6. ensuring the flow of information among partners;
7. Promoting the connection among the operators of the chain.

5.3 Target

The target of the communication plan was segmented into the following categories:

1. Beneficiaries of the opportunities of the project. This category includes all the operators of the chain, that is:
   - breeders
   - meat processors
   - meat retailers
2. all the partners of the project
3. Relevant public administrations. This category includes:
   - national public authorities;
   - regional public authorities;
   - Local public authorities.
4. public opinion, as expressed in the Commission Regulation N° 1828/2006
5. mass media
6. scientific community

5.4 Communication actions

5.4.1 Corporate image

The development of a corporate image is essential in order to achieve an identifiable and favourable image among partners and public opinion in general.

It created a graphic logo and a graphic coordinated characterizing the communication material (letterhead paper, website, brochure, block notes etc.) For the entire duration of the project.

The corporate image allowed the target of the communication actions to connect easily the single events or initiative to the whole project.

5.4.2 Training seminars

Several training seminars were organised in the various territories of the project.

These seminars allowed the exchange of experiences and good practices among the operators of the chain involved in the project. Furthermore the

seminars allowed providing information about the results of the projects and the methods used in order to achieve those results.

Particularly, 2 kinds of seminars were organized:

– seminars aimed at transferring the results of the projects and good practices to breeders and meat processors. These seminars held at a local level in all territories of the project by some experts on swine and by SOAT technicians. Every partner organized at least 6 seminars of this type;
– seminars on seasoning techniques of the meat. These seminars were addressed to breeders and to meat processors and were held by some experts on swine and by SOAT technicians. Every partner organized the seminars at local level.

5.4.3 Networking events

In order to promote the connection among the operators of different phases of the chain, some networking events that took the form of discussion around some issues and problems were organized. So, several operators of the chain from different territories of the project met in order to try solutions to their problems and to improve their work practices. These networking events were organized both at a local event and a transnational level. In the first case, operators coming from the same territory met; in the second case, operators coming from different territories of the project discussed together.

5.4.4 Educational meetings

In order to allow the acquisition of new knowledge on breeding and production techniques, some educational meetings were organized. Particularly, some breeders visited other territories and swine breeding in order to know new and different techniques of production and meat processing. This allowed both the acquisition of new knowledge and the creation of partnership that could be exploited in order to create a sale network of typical products.

5.4.5 The Qubic website

A web platform was developed in order to ensure the coordination of the participants and the dissemination of the project results to the whole

public. Particularly, the website provided complete information about the project, the partners, the project events, news from the project etc. Furthermore the project's progress and the achievement throughout the duration of the project were published on the website. The partners found here all needed information for daily management and implementation and uploaded *in itinerary* outputs, reports, photos, videos etc.

The platform could also be an e-commerce portal in order to promote traditional meat products to the general public.

The website provided a full list of all partners of the projects, with details of their mission and features.

5.4.6 Promotional material

During the project, promotional material, including posters, brochures, leaflets etc., was realized. It was used and distributed during the main events of the projects or during fairs, expositions etc.

The promotional material, coordinated with the corporate image of the project, ensured visibility to all actions.

Furthermore, some promotional videos were realized in order to spread the knowledge about the activities implemented within the project. The videos could be shown during fairs or other events attended by the partners.

5.4.7 Press/media relations

In order to ensure the regular dissemination of information to the media and then to the whole public, some press releases were written and disseminated periodically, on the occasion of major events or project milestones.

5.4.8 Publications

The publication and dissemination of results of the project is as important during the project as after the end of it. For this reason, final publications will be realized at the end of the project in order to show and transfer the results to the public.

Particularly, the publication will collect contributions by all partners of the project and contain information about the project's objectives, the articulation of the project, the partners etc.

All the phases of the project and the results achieved and the main outcomes will be illustrated in detail in order to allow the knowledge of the project to the public opinion.

The publication will be presented during the final event at the end of the project and will be sent to relevant civil servants, other public administrations, journalists, specialists, professional associations etc.

In addition, a summary report of a few pages (max 70 pp.) simpler and easier to read will be realized. It will be distributed among the breeders and other relevant subjects in order to ensure a complete dissemination of the results of the project.

Furthermore, scientific papers were periodically published by partners on some of most relevant scientific journals in order to spread the results of the project among the scientific community.

5.4.9 Final conference

The final conference will be held in the territories of Lead Partner and will present the main outcomes, products and results of the project. Each project partner will participate with a lecturer presenting the activities and the outputs produced.

Furthermore, during the conference a final publication and the follow-up of the project will be presented.

In order to give greater visibility to the project, the general public will be invited: universities, agricultural schools, professional associations, relevant civil servants, journalists, opinion leader etc.

5.5 The communication strategy

As mentioned, the communication target includes several categories of the public. Furthermore there are multiple objectives of communication. The communication strategy then will foresee integrated actions of communication, calibrating in relation to the objectives and the target.

The main message we want to communicate to beneficiaries of the project (breeders, meat processors, retailer etc.) is the opportunity to get new knowledge in order to improve their competitiveness in a context constantly changing. Given the characteristics of this group, we will use face to face communication, based on seminars and training courses. In this way, we can meet the needs and expectations of breeders and to obtain useful information for the definition of effective public policies in

order to improve the valorisation of typical meat products. Furthermore these kinds of activities will be an opportunity in order to decrease the distance that separates the public administration from the operators. This type of communication will be strengthened by publications that will be distributed to the operators during the several meetings. The language used will be easy to understand and the tone of communication will be light.

In order to communicate to the partners of the project, we will use both face to face communication (technical meetings, PSC etc.) and media communication (website and e-mail).

Furthermore we want to make the project known to the public opinion, spreading awareness of its objectives, the actions realized, the aims achieved etc. For this reason, the promotional material (brochure, dépliant, poster etc.) will be written in a popular and easily understandable language and will be disseminated by partners during fairs and other events.

Instead, a scientific language, with data support, will be used in papers published in scientific journals in order to disseminate the results of the project among the members of the scientific community.

5.6 The evaluation of the communication plan

Communication activities were subject to follow up so that the results could be evaluated and integrated within the communication strategy.

Realisation and results indicators were defined for each type of communication action developed, as shown in the following table:

Tab. 19 - Realisation and results indicators

Communication action	Realisations indicators	Results indicators
Internet website	Number of pages published, number of news, number of videos, number of photos, number of documents published	Number of visits, number of hits per page, number of pages visited, number of documents downloaded
Training seminars	Number of seminars organised, number of invitations sent	Number of participants, degree of satisfaction of participants
Networking events	Number of events organised, number of invitations sent	Number of participants to events, degree of satisfaction of participants
Educational meetings	Number of meetings organised, number of invitations sent	Number of participants to meetings, degree of satisfaction of participants
Promotional material	Number of brochures, leaflets, posters, videos created	Number of tools disseminated
Press/media relations	Number of press releases issued	Number of press articles
Publications	Number of publications realized	Number of tools disseminated

6. Conclusions and follow up

Maurizio Bonanzinga (Tuscany Region) – François Casabianca (INRA)

In the seminar on the capitalization of the MED Program 2007-2013 projects, organized by the Tuscany Region in March 2010, among the various questions provided in the questionnaires given to participants, were asked to indicate the best aspects of the project places in which they were participating. For the Qubic project the first positive aspect has been the climate of cooperation among partners that has existed since the beginning of the project. This allowed the various problems of the project to be faced with complete agreement.

One of the reasons why this collaborative climate has developed is certainly linked to an established relationship within all participants. The meetings (held in the several places of each partner) played an important role in giving to everyone a better and intelligible vision of the various areas in which the project was developed. All partners, in fact, had gained experience of specific issues related to biodiversity, native breeds at risk of extinction and traditional products.

The experience formalized by each partner has stimulated debate and in-depth reflection both in the preparation of the project proposal and in the phase of achievement. In addition, in the eight meetings that were held during the thirty-month project, a comparison between aspects of the rearing phase, processing and marketing of products was undertaken. Each subject has brought its contribution by highlighting differences, strengths and weaknesses of various realities. The comparison was particularly useful because the different expertise of the partners were able to collect different viewpoints on the issues discussed.

This approach has allowed the sharing of various experiences and contributed to the development of detailed measures invested in the project. Even the case of indigenous breeds of avian species has participated in the program as a term of comparison methodology for the realities of native pig breeds and has also made an original contribution to the aspects of quality assessment in relation to the promotion of products.

The 7 pig breeds covered by the project are representative of the indigenous pig population of the Mediterranean basin. Among the entities involved in the project, we could distinguish three realities according to the trend everyone is showing:

- The most advanced situation: the *Iberian Pig* breed in Cordoba

- The 3 stabilizing situations: the *Nustrale Pig* breed in Corsica (France), the *Nero Siciliano Pig* breed in Sicily (Italy) and the *Cinta Senese Pig* breed in Tuscany (Italy).
- The 3 emerging situations: the *Greek Pig* breed in Thessaly (Greece), the *Mora Romagnola Pig* breed and the *Nero of Parma* hybrid in Emilia-Romagna (Italy)

A – The Spanish example with the Iberian pig breed, is obviously the most important for the big numbers of pigs, the territorial dimension, the strong reputation and the significant quantity of product on the market. The farm ministry insists on a system, the "*Dehesa*", typical of the south-west Spain, which allows the coexistence of different livestock species (cattle, sheep and swine) in a balanced and sustainable system. This pastoral system, which affects about three million hectares, has allowed the development of a strong extensive animal husbandry.

In particular, the production company managing the *Iberico Pig* breed has reached a number of animals raised and a quantity of product which have led the Iberian ham to be particularly appreciated in international markets. The reality of the *Iberico Pig* is a point of reference for the other realities of farming as an organizational model of the project and of sustainable management of the environment while not comparable to the size of other native species.

B – The second type of reality in the project, the Corsican one with the pig *Nustrale* stroke, the Sicilian with *Nebrodi Black Pig* and the Tuscany with the *Cinta Senese* are to be considered as comparable. Their herd size, chain organization and strategies for exploitation of products have strong similarities, so much to constitute a reference point for other realities, also present in the project, related to the rearing of native pig breeds in the Mediterranean basin countries.

The characteristic features of this second type affect both the techniques of breeding and management stages of reproduction and supply routes that are geared towards enhancing the production with a designation of origin. In such an orientation, we could add the avian situation of the *Pintadeau de la Drôme* guinea fowl in Drôme (France), already producing with a geographical indication, but applying for a designation of origin.

Moreover, these three pig breeds have been over the last ten years a significant research and testing carried out in close contact with the world of breeding,

which has provided studies in depth into the genetics and production. The results of the research have been, even in the Qubic project, specific actions for transfers to the operators of the respective sectors.

C – The third type of realities is gathering several situations where native genetic resource is more or less available, or could be a potential resource for a territorial development: The *Greek Pig* breed in Thessaly (Greece), the *Mora Romagnola Pig* breed and the *Nero of Parma* hybrid in Emilia-Romagna (Italy). We could add in this type, the *Grise du Vercors* poult in Drôme (France) and the situation of Requena in Valencia (Spain) with regard to the *Chato Murciano Pig* breed.

In these realities, the breeds are not really stabilized and are to a certain extend a stake to be undertaken by the local actors. For example, the Greek pig is not fully recovered nowadays but the participation to the Qubic project has given new perspectives to the researchers and the breeders as well, connecting the genetic resource with the processing activities. Inside the Qubic project, they could visualize (in particular in the second type situations) the possible way to go.

A particular attention has been paid to these more fragile and uncertain situations, in order to increase the cohesion among the project partners and stimulate the exchanges within the group. Such effort is certainly a factor of success of the Qubic project itself.

The project has just developed from the monitoring of these different situations of productive lands a set of good practices to encourage the productive growth of livestock breeds.

The aspects covered by the indications of good practices had involved:

- the management of reproduction, with particular attention to the choice of breed animals for the reduction of inbreeding, breeding and management and supply phase with the aim of the reduction of production heterogeneity and improving animal performance,
- environmental management with particular reference to the use of the forest and pasturelands, for the outdoor systems,
- the management of the processing phase with emphasis on techniques of salting and seasoning of the product and finally the marketing stage.

The project activity has developed the transfer of good practices and exchange of experiences and innovations between operators and the need to strengthen the system of support addressed to all those involved in the production chain has been highlighted.

In the VIIth International Symposium on Mediterranean Pig (Cordoba October 2010) the preliminary results of the project have been presented. This symposium, held every three years, is the most important event in the scientific community on issues related to farming and processing of native pig breeds in the Mediterranean basin. In this symposium, the establishment of an association of breeders of pig breeds in the Mediterranean was proposed and this proposal was taken up during the meeting of the transnational project, which was held in April 2011 in Sicily.

The proposal of a networking of producers through the establishment of an association of Mediterranean pig may allow both a greater ability to penetrate the market and a development of individual races and this is one of the possible impacts of the Qubic project. From the experience of the project we can, in fact, identify a set of operational tools for the networking of producers such as the creation and implementation of a website, participation in events and implementation of information campaigns and communication with consumers. This association may contribute to the development of strategies to promote the production, research and transfer of innovations and may be a point of reference for public institutions and the scientific world by promoting the identification of the partnership for any international productive cooperation projects.

The Qubic project has been an important opportunity for highlighting rural realities to take into consideration. The project has allowed the transfer of knowledge in areas where agriculture is more difficult and should therefore be approached with a perspective of rural development. It has been an important work that has received the contribution of all partners, and also this publication, which reports the results, is an important testimony that testifies the positive experiences and the wealth of content. Special thanks to the Region of Sicily as the project leader. The hope would be to create a second project Qubic because new ideas and enthusiasm are present with great dynamism.

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Executive summary

François Casabianca - INRA

QUBIC project is dealing with **Q**uality **B**iodiversity **I**nnovation and **C**ompetitiveness.

It has been conceived around the question of valorisation of meat products deriving from native breeds of pigs and poultry, in 8 regions of the Mediterranean area.

MED Program

QUBIC is a project included into the framework of the MED program, a transnational program of European territorial cooperation, financed by the European Union. Its objectives are the improvement of the area's competitiveness in order to promote growth and employment for the next generation and the promotion of the territorial cohesion and environmental protection, with a view to sustainable development.

The QUBIC project is part of the first axis of the MED program entitled "Strengthening innovation capacities", in particular falls under the objective 1.2: Strengthening cooperation between economic development stakeholders and public authorities. Support transnational initiatives aiming at encouraging sustainable development and modernisation, diversification and adaptation of traditional economic sectors of the MED area (agriculture, tourism, ecotourism…).

Aims of the QUBIC project

The general aim of the QUBIC project is providing new opportunities for funding and diversifying the source of income of the peripheral areas. This will be achieved by renovation and innovation of the chain of production and distribution of cured meat products. While taking into consideration the importance of animal biodiversity as the basis for obtaining a typical and high quality product. These opportunities involve positive spin-offs on local economies both in terms of employment and protection of the territory. The aim will be achieved through the valorisation of local resources, so as to prevent a loss of animal biodiversity, and through a transfer of innovation into the production-transformation-distribution system of meat products.

Three specific objectives can be identified:

1. Settlement of the framework and current status of the production of animal

origin products, through the examination of the several aspects involved in the production chain;
2. Evaluation of training and technological needs in order to achieve a higher level of efficiency and sustainability;
3. Rationalizing and organizing the chain: a document integrating the project field into the distribution and market context has to be based on cognitive and training experiences.

Above all it has been important to organize the components of the chain within a sustainable production approach, so as to improve the market value of training actions and technological transfer activities.

Partners of the QUBIC project

The partnership of QUBIC project consists of 7 partners:

AINIA (Spain – Comunidad Valenciana): is a technological centre formed by more than 1100 companies in the food sector and related industries. The legal status of the centre is that of a private non-profit association which aim is the promotion of innovation, research and technological development (www.ainia.es)

TUSCANY REGION - DIRECTORATE GENERAL "COMPETITIVENESS OF THE REGIONAL AND SKILLS DEVELOPMENT": is a regional public administration and succeeded ARSIA (Regional Agency for development of innovation in agriculture and forestry) that led the project, on behalf of the Region, up to 31 December 2010. The Tuscany Region, through its Agency (ARSIA), has promoted an intense research activities for the conservation of indigenous breeds of animals and the valorization of production resulting from the breeding of these races among which is the *Cinta Senese* pig breed.

CHAMBRE D'AGRICULTURE DE LA DRÔME (France- Rhône-Alpes): provides support to farmers in starting breeding activities of bird breeding. Moreover the Chambre d'Agriculture de la Drôme contributes to the creation of protocols on the qualitative aspects, technical, health and food and offers a training program tailored to the needs of the production.

INA CERTH (Greece – Kentriki Makedonia): is an Institute of Agro biotechnology (INA) having as mission to conduct basic and applied research and promote innovation in the field of Agro biotechnology. INA's main objective is the development, application and use of modern technologies and innovation in the production of improved seeds and propagation material, aiming to the solution of important cultivation, food processing and agro industrial problems, in general (www. http://ina.certh.gr/ina_home.htm)

INRA LRDE (France – Corse): INRA carries out mission-oriented research for high-quality and healthy foods, competitive and sustainable agriculture and a preserved and valorised environment. Its research is guided by developments in scientific fields and focuses on worldwide challenges related to food and nutrition, the environment and land use facing the world of agriculture and agronomics today (http://www.corte.inra.fr/lrde2).

SICILY REGION – DEPARTMENT OF AGRICULTURE (Region: Sicily -Italy): is a regional public administration and is the Lead Partner of the project. The Department was involved in several transnational projects, such as Archimed, project T-CHEESE.MED – "New Technologies for traditional and historical cheese production in the Archimed Area"; MEDOCC project C.I.M.P.A. -"Meridian food and parallel monuments". The Department of Agriculture is also the lead partner of the project RURAL MED: network of exchange of experience on rural development, Programme Leader + Sicily 2000-2006, Axis 4 – Measure 2.2 – Transnational cooperation.

SSICA (Italy – Emilia Romagna Region): The Experimental station for the food preserving industry in Parma, now special Agency of the Chamber of Commerce in Parma, is an Institute for applied research, operating with the specific aim of promoting the technical and technological progress in the Italian fruit, vegetable, meat and fish processing industry. SSICA is one of the most important institutions of applied research in the food preservation sector existing in Europe and in the world (www.ssica.it).

Brief description of the native breeds

Italy (Tuscany, Sicily and Emilia-Romagna) with four pig breeds: *Cinta Senese*, *Nero Siciliano*, *Mora Romagnola* and *Nero of Parma*.

The *Cinta Senese* pig breed is originating from Tuscany and was the only Italian breed to be selected till the 50ties with a Herdbook, and presented a breakdown in the end of the XXth century. The breed is now recovered and a PDO has been obtained for the fresh meat at national level.

The *Nero Siciliano* pig breed is a native breed from the Nebrodi and Madonie hills in Northern Sicily. This breed, never selected, is now engaged in a PDO application for the processed meat products.

The *Mora Romagnola* pig breed is a very ancient breed in the Romagna area. This breed is considered as endangered and must be recovered in a conservation plan.

The *Nero of Parma* pig is a hybrid recently recognized at national level. This animal knows a real dynamism at local level.

Greece (Thessaly) with the *Greek black* pig,
The *Greek black* pig is a population to be clearly defined and protected at national level. Some breeders seem to be ready to do this job, connecting breeding farming with processing activities.

France (Corsica) with the *Nustrale* pig breed.
The *Nustrale* pig breed is a native breed from the mountainous areas of Corsica island. The management of this breed has been recognized in 2006 at national level. This breed is engaged in a PDO application for the traditional processed meat products.

Avian resources from Drôme (France) with two avian breeds:
Pintadeau de la Drôme guinea fowl is a local strain selected in Drôme for producing young animals already recognized as PGI but applying for a PDO in order to increase the valorization.
Grise du Vercors poultry is a local breed to be recovered.

Spain (Requena - Valencia region and Cordoba – Andalucia region) with *Chato Murciano* and *Iberian* pig breeds.
The *Chato Murciano* pig breed shows a possible recovery of this ancient pig breed in its native area for producing typical products.
The *Iberian* pig breed is the main pig breed in the Mediterranean type, used in several PDO products such as Iberico dry cured hams "pata negra", very famous on international market.

Main issues of the QUBIC project

1 – A SWOT Analysis

This analysis has been conducted by each local team and presenting the main features of every situation for the main products derived from the native breed.

Cordoba Area (S) D.O Ham "Los Pedroches"
Strengths: It is an indigenous product of the area, which it cannot be

imitated and it is helped, in large part, by the benefits conferred by the Iberian pig breeding in the ecosystem of the *dehesa*.
Weakness: The production is highly dependent on the number of acorns produced in the *dehesa*, varying from year to year.
Opportunities: It is an important source of job creation in rural areas.
Threats: Fraud in the labelling of the product which reaches to the consumer with false names and without fulfilling the demands required by the Denomination of Origin.

Valencian Comunidad (S) Salchichon and Sobrasada
Strengths: Strong promotion since 1993 through its annual Requena's Sausages Fair.
Weaknesses: the progressive loss of the original flavor due to the use of commercial mixtures of additives and spices.
Opportunities: Participation in public programs for SMEs as a way to have economic support for carrying out new projects and promoting
Threats: Loss of cultural heritage: doubtful hereditary continuity.

Toscana (I) Salame, Coppa, Lard, Ham
Strengths: The quality of meat and especially the fatty component, influenced by the acidic composition of the fat
Weakness: the variability in the quality of the raw materials due to different livestock management
Opportunities: the constitution of the consortium for the protection of the Cinta Senese,
Threats: the production and marketing typologies are not yet standardized; the demand/supply ratio is often unstable since the chain is not well structured

Emilia-Romagna (I) Salame, Culatello, Pancetta, Coppa, Ham, Lard
Strengths: Production based on local know-how and tradition.The salumi are appreciated for its quality.
Weakness: Difficulty to produce all year and with constant characteristic.
Opportunities: Tourism increasing. Creation of a territorial brand.
Threats: The absence of a strong cooperation. Loss of cultural heritage.

Sicilia (I) Salame, Pancetta Capocollo, Ham, Lard, Guanciale
Strengths: characteristics of products related to raw material and the type of diet.

Weakness: Small batches without a standardization of the product.
Opportunities: Involve a larger number of companies in the certification of the Slow Food.
Threats: Insufficient generational replacement

Greece Trikalian sausages Tzoumagias sausages
Strengths: raw material of great quality. Experience of the owner.
Weaknesses: unsatisfactory co-operation with community authorities.
Opportunities: local development. Promotion and communication.
Threats: difficult working conditions.

Corsica (F) Lonzu, Coppa, Prisuttu
Strengths: Raw material deriving of the extensive pig system. No ingredient which give the peculiarity of the final product.
Weaknesses: The lack of technical formation improving the traditional features. The lack of some equipment that allows a better control of the product evolution.
Opportunities: Important role of territorial authorities to develop traditional products, supporting the PDO application and all the devices able to clarify the market.
Threats: Lack of young people able to maintain the production through generations

2 – Production systems and types of farming

In most of the reality under investigation there is a close link between farm and herd in the sense that breeding takes place within the agricultural activity and, for this type of pig, cases of herds "landless" are rare. This is due to the fact that breeding is always "outdoors" with varying degrees of free ranging and of use of natural resources to supplement animal feed. However, the allocation of farmland to the rearing of pigs is generally limited and the areas of pasture (both herbaceous and forestry) are often undersized.

Assessing the impact of grazing on the farmland area and its relation with the consistency of sows it can be proposed an estimation of the degree of intensification of the various types of rearing that puts, in ascending order, the following ranking: *Nero of Parma*, *Mora Romagnola*, *Cinta Senese*, *Greek Pig*, *Nebrodi Black Pig*, *Nustrale, Iberico*.

According to the productive performances, we can notice a great coherence among the various situations, in particular, the areas where the native pig is reared in an extensive system based on natural resources.

Range of Age (in months) and weight (in Kg) at slaughter in the various native pig breeds.

	Age range	Weight range	Weight class of max. freq. (age range)
Nebrodi Black Pig	6 – 18	50 – 150	80 – 100 kg (6 – 12 mo.) 10 cases
Cinta Senese	12 – 26	120 – 210	150 – 160 kg (12 – 26 mo.) 12 cases
Mora Romagnola	14 – 18	150 – 180	160 – 170 kg (14 – 18 mo.) 14 cases
Nero of Parma	12 – 24	120 – 240	180 – 200 kg (12 – 21 mo.) 12 cases
Nustrale	12 – 18	80 – 120	80 – 100 kg (12 – 18 mo.) 9 cases
Greek Pig	6 – 12	30 – 60	40 – 80 kg (7 – 12 mo.) 6 cases
Iberico	12 – 24	140 – 160	
Pig of *Plana de Utiel-Requena*	5.5 – 7	100 – 115	105 – 110 kg (6 – 7 mo.) 6 cases

3 – Breeders in the territorial stakes

We approached the points of view of the breeders in extensive systems based on local breeds, on their insertion in the dynamics of territorial development. A questionnaire including 4 parts and 12 questions were managed towards 123 farmers carrying on their activities of pig production based upon the local breeds, in the 5 areas interested by the project. In addition, the same questionnaire has been used in two other areas of the project: Spain (Valencia area) without any local pig breed, Continental France (Drôme) with two local poultry breeds (*Grise du Vercors* poultry and *Pintadeau de la Drôme* guinea fowl).

Data collected and compared analysis relate to

- *environmental problems*: As major issue, we can see that a great part of breeders are not aware of environmental problems. This must be addressed during the presentation of the results to the local breeders as the environmental issue seems to be under-estimated.

- *visions of the territory and local insertion of activities*: As main issue, we can assume that the image of the breed is adding value in an effective way. Pictures of the animal from the local breed are frequently used as an identity marker, and also on the commercial brand. The breeders are using the image of their breed for commercial use.
- *local breed seen as a factor of anchorage of the activities*: As main finding, local breed insures deep anchorage to the territory and seems to be well adapted. Crossbreeding seems to be disappearing in almost all the areas.
- *Professional identity of the stockbreeder of local breeds*: As a very original issue, major part of breeders is proud to promote a local breed, but they are also claiming, in several areas, to be better recognized.

4 – Processing techniques

The identity of traditional products reflects the unique combination of local natural resources (climate, soils, local breeds and plant varieties, traditional equipment, etc.) and cultural ones (traditions, know-how and skills, some of which are transmitted through generations) in a given territory, linking the product, the people and the place. This process involves different actors, who coordinate and harmonize their production and commercial practices.

The framework of such process is organized as follows:
Definition of the production area: Description of the production area. When needed, distinction between the production area of the raw material and the production area for processing and conditioning.
Demonstration of the specific quality linked to geographical origin: Focus on the elements justifying the link between the specific quality and the resources in the geographical area (natural and human ones).
Name of the product: Indicate the traditional name of the product
Description of the product: The main physical, chemical, microbiological or organoleptic characteristics of the product, focussing on features that are easily assessable.
Ingredients and raw materials: The ingredients and raw materials that should be used in the production process, and/or ingredients and raw materials that should not be used.
Definition of the process: The method for obtaining the traditional product in all the phases of the production process (agricultural production,

transport, processing, conditioning, seasoning/aging and including final packaging). If needed, insert explicit prohibition for using some production methods. Focus on relevant phases and aspects.
*Control plan - verification system***:** Description of how the controls will be used and, when needed, the certification system.

According to the working phases, some technical solutions are recommended:
Temperature of meat and storage rooms: At the reception, the temperature of the meat carcasses and meat pieces must be below 5ºC. The storage temperature is done at 3-4ºC in refrigerated chambers, and during the processing step, the temperature doesn't exceed 5ºC until the casing filling step.
Selection of meat and preparation: Keep the temperature of meat to appropriate values (refrigeration), assessing the time to stop the meat under conditions of controlled temperature. Always operate facilities and equipment in clean and hygienic conditions as best as possible.
Casing preparation: The natural casings are previously decontaminated using vinegar and it is common to use oranges, citron to give a better flavor to them. Previous to their use, natural casings were submerged in fresh water in order to desalt them and to avoid breaking.
Weighing, milling and mixture preparation: Prepare all the ingredients in appropriate quantities. Grind / cut the meat (fat and lean fractions together or separate depending on the type of sausage), add ingredients and any additives, mixer mechanically or manually. The quantities of the various components can be made on the basis of a recipe or subjective "eye", this second method may be acceptable to the choice of the meat parts but may have problems of accuracy for ingredients and is to be discarded for food additives (e.g. nitrate), used in very small amounts that are not noticeable without the aid of a scale that is sufficiently precise.
Salting phase: Use appropriate salting temperatures between 2 and 5° C and room temperature humidity values > 75%.
Control of environmental parameters during maturation: The correct environmental characteristics and the constant visual supervision of the products during its drying and curing steps allow producers to avoid problems with humidity.
Traceability: The product label has the necessary information for allowing its traceability (product name, ingredients, batch number, manufacturer's name and sell-by date).
Self-control plan: Microbiological analysis of the surface and the products.

The surface analysis is carried out twice a year, and in case of the cured products, the microbiological analyses are carried out once a year as well.
Training: The set of actions structure is designed to increase the knowledge and know-how of employees. In traditional activities, this is ensured between younger and more experienced staff.

5 – Best Good Practices to be shared

Such good practices are inspired by the main advanced system ie the *Iberian Pig* breed in *dehesa* area, and it could be considered as useful for all the situations with outdoor system where pigs are freely using pasturelands.

- Placement of protective fences around the roots of the oaks to protect them from the animals on the pasture.
- Performing duties in support of natural or artificial regeneration by sowing or planting trees.
- Collection of slurry before the rains to prevent the accumulation of nitrate in playgrounds, by trenches placed on a slope.
- Avoid if possible the visual impact on the farm, by planting resistant trees to nitrates and deep roots, such as mulberry.

Other measures that can be considered good practice in an extensive livestock facility and may have a positive impact on the environment as listed below:

- Establish training programs for the staff of the farm. Operators must be familiar with the production systems and be well trained to carry out the tasks for which they are responsible. They must learn and understand the impacts and environmental risks linked to the activity performed.
- Record the consumption of water, energy, feed on the farm, to achieve better efficiency in the use of raw materials.
- Establish an emergency protocol to respond to any unforeseen incident. The protocol should identify potential sources of incidents with potential environmental impact, conduct a risk analysis and develop control measures to prevent, eliminate or reduce risks associated with potential incidents identified.

Conclusions of the QUBIC project

The 7 pig breeds covered by the project are representative of the indigenous pig population of the Mediterranean basin. Among the entities involved in the project, we could distinguish three realities according to the trend everyone is showing:

A – The Spanish example with the *Iberico Pig* breed is obviously the most important for the big numbers of pigs, the territorial dimension, the strong reputation and the significant quantity of product on the market. The farm ministry insists on a system, the "*Dehesa*", typical of the south-west Spain, which allows the coexistence of different livestock species (cattle, sheep and swine) in a balanced and sustainable system. This pastoral system, which affects about three million hectares, has allowed the development of a strong extensive animal husbandry.

In particular, the production company managing the *Iberico Pig* breed has reached a number of animals raised and a quantity of product which have led the Iberian ham to be particularly appreciated in international markets. The reality of the *Iberico Pig* is a point of reference for the other realities of farming as an organizational model of the project and of sustainable management of the environment while not comparable to the size of other native species.

B – The second type of reality in the project, the Corsican one with the *Nustrale Pig*, the Sicilian with *Nebrodi Black Pig* and the Tuscany with the *Cinta Senese* are to be considered as comparable. Their herd size, chain organization and strategies for exploitation of products have strong similarities, so much to constitute a reference point for other realities, also present in the project, related to the rearing of native pig breeds in the Mediterranean basin countries.

The characteristic features of this second type affect both the techniques of breeding and management stages of reproduction and supply routes that are geared towards enhancing the production with a designation of origin. In such an orientation, we could add the avian situation of the *Pintadeau de la Drôme* guinea fowl in Drôme (France), already producing with a geographical indication, but applying for a designation of origin.

Moreover, these three pig breeds have been over the last ten years a significant research and testing carried out in close contact with the world of breeding, which has provided studies in depth into the genetics and production. The results of the research have been, even in the Qubic

project, specific actions for transfers to the operators of the respective sectors.

C – The third type of realities is gathering several situations where native genetic resource is more or less available, or could be a potential resource for a territorial development: The *Greek Pig* breed in Thessaly (Greece), the *Mora Romagnola Pig* breed and the *Nero of Parma* hybrid in Emilia-Romagna (Italy). We could add in this type, the *Grise du Vercors* poult in Drôme (France) and the situation of Requena in Valencia (Spain) with regard to recovering the *Chato Murciano Pig* breed.

In these realities, the breeds are not really stabilized and are to a certain extend a stake to be undertaken by the local actors. For example, the Greek pig is not fully recovered nowadays but the participation to the Qubic project has given new perspectives to the researchers and the breeders as well, connecting the genetic resource with the processing activities. Inside the Qubic project, they could visualize (in particular in the second type situations) the possible way to go.

A particular attention has been paid to these more fragile and uncertain situations, in order to increase the cohesion among the project partners and stimulate the exchanges within the group. Such effort is certainly a factor of success of the Qubic project itself.

The proposal of a networking of producers (during the final seminar of the project) through the establishment of an Association of Mediterranean pig may allow both a greater ability to penetrate the market and a development of individual races and this is one of the possible impacts of the QUBIC project. From the experience of the project we can, in fact, identify a set of operational tools for the networking of producers such as the creation and implementation of a website, participation in events and implementation of information campaigns and communication with consumers.

The QUBIC project has been an important opportunity for highlighting rural realities to take into consideration, based upon native breeds and processing traditions. The project has allowed the transfer of knowledge in areas where agriculture is more difficult and should therefore be approached with a perspective of rural development.

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Appendix

Annex 1: Questionnaire used in the enquiry of Action 2.2

2.2.0 Some definitions / Territory: multiple meanings

Note: The "territory" has several dimensions. It is a biophysical reality. It can be an area appropriated by a social group. And it also has an institutional dimension. We propose not to start with an initial definition of the territory as seen by the farmer, but to deduce after the interview how the farmer is conceiving his territory. So this note is dedicated to the interviewer and not to the farmer.

1.1.1 Environmental aspects

Q 1 Are you facing some environmental problems in your livestock farming? For example water pollution, soil erosion, plants and trees destruction, animal divagation?

Q 2 What is the last problem you were obliged to deal with?

Q 3 Have you ever met other problems? And of which nature?

Q 4 Do you use nose ring in order to protect the natural resources from some animal waste?

Q 5 what kind of disease (parasite as trichinellosis, bacterian as mycobacterium tuberculosis, virus as influenza, Aujeszky or swine fever) are present?

Q 6 Have you lost some animal recently because of some of these diseases? If yes, which disease?

Q 7 In case of disease infestation, which prevention plans will you organize?

Q 8 Due to extensive livestock system, are you obliged to consider wild animal diseases in your prevention plan?

2.2.2 Appropriateness

■ Satisfying criteria as seen and managed by farmers

Q 9 Do you consider the local breed as fully adapted to the constraints of the local farming system?

Q 10 What do you expect from this breed? And what are its defects?

Q 11 How do you evaluate the ability of some animals within the herd?

Q 12 What are the main selection criteria according the rearing orientation you are using in choosing some animals and eliminating others?

■ Others Breeds on the territory and reasons of the choice

Q 13 Have you any experience of the other breeds and how do you know

Q 14 Is there any information provided by extension services?
Q 15 On what kind of criterion do you compare the local breed and the foreign ones?
Q 16 And what are the interests and the limits of each one?
■ Potential interest of crossbreeding
Q 17 Have you effective practices of crossbreeding?
Q 18 And what is your point of view on those practices?

2.2.3 Organizational aspects

■ Local Management of the breed
Q 19 Could you give some insight on the history of the breed?
Q 20 Is there any management scheme?
Q 21 Only dedicated to conservation or including some selection (and on what kind of criteria?)?
Q 22 Is there any collective organization of the breeders?
Q 23 Are you member and since which year?
■ Collective feature location
Q 24 Is the management body providing collective tools (male and female renewing, artificial insemination, coupling reasoning) for genetic management?
■ Research and extension services
Q 25 Do you know which types of stakeholders are involved in the organization around the local breed?
Q 26 Have you an idea of which types of territorial financial support for all the collective features?
■ Networking
Q 27 Is there other local breeds in the territory?
Q 28 Are you participating to collective discussion around those local breeds in the territory?
Q 29 Is it formalized in a specific organization?

2.2.3 Professional identity

■ Vision of their job by the autochthonous breed farmers
Q 30 Do you feel that the local breed is insuring you a deep anchorage in the territory?
Q 31 Is the local breed a familial heritage transmitted by the previous generations or something completely new?
Q 32 Are you claiming to be considered as a distinguished activity compared to exogenous breed farmers?

Q 33 Are you feeling proud to be a local breed promoter?

■ Phenotypic traits

Q 34 Is there any visible characteristics (color, coat, morphology) that could be considered as really important according your vision of the local breed?

Q 35 What is the role of the standard?

Q 36 Do you give some importance to diversity within the breed?

Q 37 Are you aware of the consanguinity question?

Q 38 Are you ready to conserve some part of the breed even less productive ones?

Q 39 Do you establish a link between the "good breeder" and the "beautiful animal"?

2.2.4 Valorization and market connection

■ Specific collective organization for valorization?

Q 40 Do you think breed goodwill and territory linkages represents added value?

Q 41 Is the breed well known in the territory and do you use the image of the breed and/or of the territory to sell your products?

■ Quality assurance scheme

Q 42 Are you concerned by a Quality sign?

■ Collective features

Q 43 Slaughterhouses, marketing tools, brands, direct selling, Processors and Ageing, dedicated stores. Are they easy to access for you?

Q 44 Is there any quality insurance scheme associated to the breed? Linked to the territory (geographical indication for instance)? Are you involved in it, since which year?

Annex 2: Report from each area of the project

Report Framework for QUBIC 2.2
Proposal of plan:
The main orientation is to know more about the internal diversity of the interviewed actors. So, we need to have an overview on the dominant answers but also on the less frequent feelings and practices.

1. **The types of environmental problems encountered.**
   This part should be a typology of the environmental problems encountered. For each problem, the diversity of actions that are initiated to solve them should be described.
2. **The types of vision of the link to the territory.**
   This part should be a typology of the breeders following their vision of the link to the territory (importance of the local breed, adaptation of the breed to the territory and selection criteria important for the breeder).
3. **The breed in its territory.**
   This part should detail the question of the breed in its territory: is it the only local breed? If it is not the case is there an organization gathering various local breeds in the territory? Is the breed concerned in crossbreeding? Is this practice marginal or important?
4. **The professional identity of local breed breeders.**
   This part should detail how the breeders see their own job: do they have a homogenous vision of this job or are the answers diverse? Can we bring out several types for this question?
5. **SWOT for the territorial and environmental features**
   This part should be a SWOT considering an overview of all the questions of this part of the questionnaire, at a territorial level.

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