Fondo Europeo Agricolo per lo sviluppo rurale: *l'Europa investe nelle zone rurali*

UNIONE EUROPEA

PROGRAMMA DI SVILUPPO RURALE PSR sardegna

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

DAIRY CHAIN PROJECT

TECHNICAL REPORT

DairyCHAIN Project:

Integration of dairy cattle, goat and sheep farms into a unified and sustainable dairy chain.

ASSEGNATARI ASSOCIATI ARBOREA

CAO FORMAGGI

UNISS UNIVERSITÀ DEGLI STUDI DI SASSARI

DIPARTIMENTO DI AGRARIA

Project finalized with the contribution of the European Fund for Rural Development, RURAL DEVELOPMENT PROGRAMME 2014-2020, SUBSECTION 16.1 - SECOND PHASE "Support for the establishment and management of pei operational groups on agricultural productivity and sustainability."

1. Working group and project partners

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Section of Animal Sciences.

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CAO Cheeses - Sheep Breeders Cooperative

Dr. Emiliano Attardi, Business Controller

Dr. Giangavino Buttu, Quality Office Manager

2. Companies that participated in project activities

- 3A Assegnatari Associati Arborea SCPA
- CAO Formaggi - Cooperative of Sheep Breeders
- Farm Magnani Società Agricola Soc. Semplice
- Farm Taviani Manolo
- Farm Petucco Sandro e Marco Soc. Agricola Soc. Semplice
- Farm Ena Giuseppe
- Demontis and Scanu Agricultural Company

3. Acknowledgments

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- UNISS colleagues, students and collaborators for applied field research and dissemination

4. The Dairy Chain Project

The dairy market has always been characterized by a "production" approach of business that has read the market according to the type of milk used for different dairy productions. Consumers are used to evaluating food from other points of view and not necessarily on the basis of the species from which the milk comes. Starting from the need to systematize and harmonize Sardinia's three dairy supply chains, the goal of the project is to lay the foundations for a supply chain managed in a coordinated way so as to enhance the value of the three types of milk through innovative products that can bring more added value to the market. The goal of the project was to systematize the cattle, goat and sheep supply chains with a common approach of auditing production and organizational quality to:

- improve decision-making in companies according to efficiency parameters;
- increase the awareness of processing co-ops with respect to the performance of production companies in the three supply chains;
- define synergistic development objectives at the territorial level with the involvement of the 3 species.

The DairyCHAIN project, articulated over the three-year period 2023 - 2025, stems from the need to overcome the traditionally productivist approach of the Sardinian dairy sector, historically divided by species (cattle, sheep and goats), in favor of a unified management model, oriented toward quality and sustainability. It is proposed to create a "unified milk supply chain," which is not based on differentiation by species, but on common criteria for management, control and performance enhancement. This new vision aims to better respond to market and consumer needs, prioritizing nutritional quality, economic efficiency and environmental sustainability.

The main objective of the project is to create an integrated dairy supply chain that unites cow, sheep and goat milk production through a shared management and performance evaluation system. This system was supported by information technology tools, monitoring protocols and management models (G_HACCP and Lean Management) to increase production efficiency, product quality and environmental sustainability. Integration was facilitated by training, cooperation and dissemination of results. The project is structured around several main areas of action, each of which includes specific objectives aimed at building a unified, multispecies, efficient and sustainable dairy supply chain.

In particular, the project aims to create the basis for forming a "unified dairy supply chain" by eliminating the focus by species and considering that the management approach of high-productivity cattle, sheep and goat farms that allocate their products to processors is fundamentally similar within farming systems. With this in mind, specialized dairy sheep, cattle, and goat systems (intensive, stall-based, high-input, high-productivity) should be managed with similar management approaches and protocols, different from those used in multifunctional or extensive or mixed-livestock systems. Specialty farms are characterized by performing "food provisioning," the production of milk and meat for market, as their main ecosystem service, and should orient their management toward business approaches that can minimize the cost of production and environmental impact and maximize the product brought to market per unit of input, per unit of land, and per operator employed in the process. The Dairy Chain project aimed to decline this criterion into a study, research and cooperation approach across 3 supply chains oriented with respect to objectives of:

- (i) nutritional quality for the management of animal feed on farms;
- (ii) management quality to ensure technical efficiency and high profits for the producer;
- (iii) environmental quality to ensure sustainability in resource use and minimization of greenhouse gas impacts above all.

The project was developed in 4 actions:

- AREA A Cooperation,
- AREA B Project implementation activities.
- AREA C of facilitation and of the innovation broker,
- AREA D of dissemination.

- **AREA A - Cooperation and stakeholder engagement.**

This area aims to foster the adoption of a new shared organizational model among partner companies. The specific objective is to promote a culture of cooperation through training activities, operational meetings and the establishment of a stable working group. In this way, awareness of the role of each actor in the supply chain is strengthened and the foundations are laid for participatory co-design.

- **Area B - Monitoring of business performance.**

This area focuses on various activities aimed at assessing and improving the performance of companies in multiple aspects. Protocols for monitoring the nutritional quality of livestock feed, milk and wastewater will be implemented (**B1.1**), while data collection tools will allow analysis of the technical-economic efficiency of farms (**B1.2**), highlighting management strengths and critical issues. In parallel, a system of indicators was implemented to measure environmental sustainability (**B1.3**), through standardized methodologies such as Life Cycle Assessment. To support these activities, an IT platform (**B1.4**) was developed to store data, calculate indicators and facilitate comparison between companies in a homogeneous and transparent manner.

This area aimed to introduce innovative management tools to increase the efficiency of companies. An approach inspired by the HACCP model, but oriented toward business management (G_HACCP), was adopted, with the aim of identifying critical points in production processes and implementing corrective actions (**B2.1**). In addition, the introduction of lean management (**B2.2**) has made it possible to simplify operational flows, reduce waste and increase the value generated, through the direct involvement of staff in goal setting and change management.

- **Area C - Innovation broker**

This area aimed to facilitate the integration of expertise and stakeholders to achieve cooperation goals.

- **Area D - Integration and dissemination.**

The last area aimed to consolidate the unified supply chain through integration among different supply chains (beef, sheep, goat), promoting strategic alignment among partners through the support of innovation brokers. In addition, dissemination and transferability activities of the results and tools developed were put in place, both to partner cooperatives and to other entities interested in adopting the model, to amplify its impact on the territory.

The following areas correspond to respective project actions described in the following sections in detail.

- ACTION A: ACTIVITIES RELATED TO THE EXERCISE OF COOPERATION.

With respect to the activity of Cooperation, the project envisioned the strengthening of membership in the chains of origin and awareness of membership in the specialized chains of other species. Specifically, the objectives of Action A were to stimulate the adoption of the new organizational model through training of partner companies with the expectation of creating the basis for forming a unified milk supply chain that evaluates the performance of the supplying companies with the same indicators and management approach. This negates the focus by species and considers that the management approach of high-productivity cattle, sheep and goat farms that send their products to processors is fundamentally similar and is oriented with respect to quality management objectives for consumer health, farm profitability and environmental impact. Crucial to this was the set of meetings held between UNISS staff and members of the cooperatives and partner companies, and especially the interaction created through the series of meetings organized by inviting external experts and testimonials. The outcome was that the main drivers of future management of the companies are to be studied in the aspects of:

- generational turnover,
- labor quality and social welfare,
- quality and technical efficiency for operators' profitability,
- business management skills,
- business organization.

The cooperation of this project has generated the involvement of many young farmers and children of farmers who have followed with motivation the training and dissemination meetings of the days organized in the area with local and National experts. Currently, a group of motivated young people has been created to discuss the criteria of farm management and even more important of the future of cooperative management as stated by the young people themselves at the meetings with the experts. A strong sense of responsibility emerged in which the young people expressed the need for specific training to lead companies and cooperatives in the near future. The Dairy Chain project is particularly pleased with this goal and the University of Sassari has already planned a series of activities to be carried out in the fall after the sowing of herbage and made contacts with American sheep and beef Dairy farmers associations for contact and comparison between farmers.

In addition, the project in organizing events and educational meetings (detailed in the dissemination part) fostered the involvement of many industry experts with a variety of cross-cutting and multidisciplinary skills who interacted with farmers, their families and technicians to give a networking structure and show the need for interaction for a conscious supply chain. Particular added value came from the fact that the project brought to the area experts from the national scene, entrepreneurs of livestock farms, breeders and technical operators, universities and consulting firms or company managers, who acted as testimonials in their approach on the dairy sector, from the barn to the market.

Below is a list of the figures involved and external to the project and the topics of interest:

Perspectives and issues in the sheep sector:

- Dr. Emiliano Attardi (Economic Advisor - CAO Formaggi)
- Prof. Antonello Cannas (Lecturer in Nutrition UNISS)
- Dr. Michela Cannas (UNISS researcher)

Business management moving from family to entrepreneurial model

- Dr. Davide Anselmi (Economist and Agricultural Entrepreneur - Cremona)
- Dott.sa Ilaria Sgariboldi (Legal advisor for livestock companies - Cremona)

Approach" One Healt" and gender equality

- Dr. Valentina Daprà, (Editor-in-chief "ExDairyPRESS"),
- Dr. Emanuela Sorgia (Veterinary doctor- Bologna),
- Adriana Busi (Manager and breeder - Pavia)
- Prof. Francesca Mossa Associate Professor of Veterinary Gynecology, UNISS,
- Dr. Donata Nativi (Veterinary physician - Milan)
- Feb. 2025, "The National and European Dairy Farming Context:

Milk market and business management

- Dr. Paolo Grendene (Agronomist, MBA, Former CIRIO Director),
- Dr. Cristian Rota (PhD, Alliance Dairy Consulting, Milan).

Precision Feeding

- Prof. Francesco Masoero (Professor of Nutrition, UNICATT; Piacenza),
- Prof. Antonio Gallo (Professor of Nutrition, UNICATT Piacenza),
- Prof. Andrea Formigoni (Professor of Nutrition, UNIBO, Bologna)

Generational change and innovative personnel management and sustainability

- Dr. Elena Gargiulo (Lawyer and People management consultant, Cagliari, Italy)
- Dr Sebastiano Curreli (Cooperative 3A Arborea)
- Dr Emiliano Attardi CAO Formaggi.

From the point of view of reporting and completeness of activities, the mentioned organizational problems and project timelines did not allow for the execution of all field activities and attendance, so fewer hours of commitment of farmers and partners were reported than expected. However, the project goal can be considered to have been achieved in view of the activities planned in the future, some of them even exceeding expectations, in continuity with this project

- ACTION B: PROJECT PLAN IMPLEMENTATION ACTIVITIES

Action B was declined into 2 main objectives:

- the first Objective B1 for the qualitative improvement of productions from the point of view of technical, economic and environmental efficiency of the supply chain. The objective was to improve the production process according to the principles and good practices of sustainable intensification.

Objective B1 was declined into 4 specific objectives as listed below:

- B 1.1 Establish a food quality monitoring protocol for products and effluents from the feedlots, for the improvement of the nutritional quality of the process.
- B 1.2 Establish a monitoring protocol of the technical economic efficiency of the conferring farms, for the improvement of profitability performance.
- B 1.3 Establish a monitoring protocol of resource use efficiency to assess the environmental impact of the conferring farms, for the improvement of environmental performance.
- B 1.4 Develop a computerized tool for archiving inputs and business performance indicators to enable monitoring of the three species' conferring farms based on the same performance indicators outlined in Actions B1.2 and B1.3.

- The second Objective B2 was declined into two specific objectives for management improvement in which to develop and implement a management approach according to the criteria of process engineering (an HCCP like approach) and according to the criteria of Lean management for decision making and time management.

Objective B2 has been declined into two specific objectives:

- B 2.1 Implementation integrated management plan: Definition and Implementation process management plan: HCCP program. Definition of a G_HACCP protocol i.e. a management HACCP of dairy supply chains.
- B 2.2 Implementation integrated management plan: Definition and Implementation process management plan with Lean management approach.

The activities carried out for Action B were fully implemented and are described in the following sections according to specific objective.

- **ACTION B: Project implementation activities**

Objective B1.1: Establish a monitoring protocol of the quality food products and effluents of the conferring farms, for the improvement of nutritional quality with the purpose of identifying farm problems of nutritional quality, related to poor quality of feed used for animals, low animal health and poor milk quality (organoleptic, sanitary) and characterize the farms.

The activities carried out involved collecting samples of livestock feed and milk to characterize the nutritional quality of the production process in sheep cattle and goat farms in different seasons and comparing the performance observed in the three species raised in specialized systems.

The activities were carried out as per the project schedule except that the NIR analysis instrument was not purchased as planned and the analyses were done at the analysis laboratory of the Department of Agriculture, University of Sassari. The decision not to purchase the instrument by the Lead Partner stems from decisions related to the farm support strategy, which was reprogrammed following the installation of the new Council. From a technical point of view, the motivation is related to the fact that now many feed companies and the Producers' Cooperative itself in recent years have portable NIRs that carry out the analysis service directly on the farm (for all species) or feed mill with very short timelines and it does not appear necessary to purchase an expensive machine for a partial service in the territory. This choice has not affected the achievement of the objectives of analysis and improvement of food management processes. The activities performed are described in the project reports (deliverables) attached to this report and named as below and cover the sample collection guide, the characterization performed, and the comparison for a single supply chain approach.

Name of descriptive report	**Name of the delivered and attached file**
Biological sample collection guide and analytical parameters to be determined for characterization of nutritional quality	1. B1.1_Biological sample collection manual.
Report of characterization of food quality of farms in different seasons	2. B.1.1_Report food characterization
Report of comparison of quality nutrition observed in the 3 species in relation to the objectives of the single supply chain	. B1.1_Report of Comparison of Nutritional Quality.

- **ACTION B: Project implementation activities**

Objective B1.2: To establish a protocol for monitoring the technical and economic efficiency of the conferring companies, for the improvement of profitability performance, with the aim of performing a periodic (bimonthly) characterization procedure o f the performance of the member companies regarding technical efficiency and economic efficiency.

The activities carried out involved the collection of technical-economic data and the calculation of partial indicators of technical and economic efficiency, trying to homogenize the approach in cattle, sheep and goat species from the point of view of the nutritionist technician and the farmer.

The characterization activities were carried out entirely by developing a data collection and indicator calculation manual with specific examples of the farms surveyed, performing the characterization of the farms with regard to their performance and benchmarking, and comparing the results obtained among the different species.

The activities performed are described in the project reports (deliverables) attached to this report, named as below and covering the data collection and indicator calculation guide, the technical-economic characterization performed, and the comparison of the three species in a single supply chain approach.

Name of the descriptive report	**Name of file delivered and attached**
Manual of survey data required to performance characterization	6. B.1.2_Monitoring_quality_management
Report of technical-economic characterization of the companies	5. B.1.2_Comparison of technical economic.pdf
Report comparing the performance of the 3 species in relation to the objectives of the single supply chain	4. B.1.2_Characterization of species

- **ACTION B: Project implementation activities**

Objective B1.3: Establish a monitoring protocol of resource use efficiency to assess the environmental impact of contributing farms with the aim of promoting the improvement of environmental performance and annual characterization of member farms regarding environmental performance.

The activities carried out involved technical data collection and calculation of environmental indicators in particular, a Life Cycle Assessment (LCA) study was carried out to estimate the greenhouse gas emissions of member farms of cooperatives and sheep, beef and goat farms by developing a guide manual for data collection (Inventory or LCI) and calculation of Carbon footprint (Impact Assesment).

The activity was carried out in its entirety; in addition, a survey of a representative sample of about 40 percent of 3A farms was carried out, which led to certifying the LCA analysis for 3A Cooperative's milk from cradle to barn gate, and then including this data in the Cooperative's 2024 Sustainability Reports.

The work carried out is described in the project reports (deliverables) attached to this report, named as below and covering the data collection manual for LCA and the environmental quality characterization report for the 3 species comparison.

Name of the descriptive report	**Name of file delivered and attached**
Data collection manual for LCI and LCA and for the estimation of environmental indicators	7. B.1.3_LCA Manual.
Report of environmental results and performance comparison of the single supply chain	8. B1.3_Report environmental quality

- **ACTION B: Project implementation activities**

Objective B1.4: To develop an information technology tool for storing inputs and farm performance indicators to enable monitoring of the conferring farms of the three species, with the aim of having software for farmers at the cooperative level to monitor the performance of member farms against production process inputs and performance indicators as elaborated in Actions B1.1-B1.3.

The activities involved the use of a cloud-consultable information tool for herd management control with included functional use document for farmers and technicians especially. This activity underwent a change from what was planned in the project. The idea was to produce a data warehouse, similar to the structure previously present in the 3A cooperative and active in the years 2012-2014, with the collaboration of partner NOA Solution srl. Partner Noa Solution, as a result of engagement in numerous projects, decided not to participate in the Dairy Chain project without carrying out the planned activities. With the aim of maintaining the project objectives, the Scientific Officer Prof. Atzori reprogrammed the activity of the IT tool by aligning the technical objective with the current need of dairy companies and in line with the requirements of the new Lead Partner Board regarding the support strategy for member companies. Specifically, rather than building a cloud database on partial indicators of technical efficiency, it was decided to equip the companies with cloud software used by ARALombardia for calculating the economic balance sheet and management control in dairy farms. The relationship with ARAL was initiated through the personal and professional contacts of the scientific officer for the purpose of achieving the cooperation objective envisaged in this action B1.4. Therefore, licenses of the G€CO (ARAL) software, already widely used in Lombardy for profit and loss accounts of dairy farms, were opened to partner companies and other interested parties, and the data needed to develop a management control process and profit and loss account calculation were uploaded. The software has also been applied to sheep and goat farms, as an extension of what has been carried out in Lombardy. This activity is now very advanced in terms of the approach to farm management, is in line with the needs of the national sector, which is looking for computer tools that can give the banks income statement information of the farms for a more informed access to credit, and with the management control activities developed in Action B2.

The activity has been modified but the objectives of research and of the specific Action B can be considered achieved. What has been done makes it possible to perform advanced economic monitoring in companies that intend to start management controls, align the approach adopted to the different species and in addition compare and contrast productive

and economic performance of Sardinian farms with those in Lombardy (ARAL) considering that the same software and type of data are used. In this sense, work hours proportional to those required for reprogramming of activities and objectives, data loading and field testing, and breeder training and implementation were committed, with slightly less commitment than for the development of an entire information system planned with Noa Solution srl. We were able to find a particular degree of satisfaction of the Lead Partner and the farmers with the proposed and implemented alternative solution, given its direct applicability and usability on the farm.

The activity carried out is described in the project reports (deliverables) attached to this report, named as below and covering the management control IT tool use manual including the IT tool engineering report with the 3 species compared.

Name of the descriptive report	**Name of file delivered and attached**
Functional document and user manual of the tool	9. B.1.4_Engineering tool information

- **ACTION B: Project implementation activities**

Objective B2.1: Implementation of integrated management plan: Definition Implementation of process management plan: HCCP program. Definition of a G_HACCP protocol i.e., a dairy supply chain management HACCP for feed supply and ration preparation; milking management and milk quality; management of reproductive and genetic aspects; management of replacement and culling; and management of health problems, with the aim of promoting the adoption of the G_HACCP protocol for the management of partner farms, improving farm management awareness and profitability, product quality and environmental performance.

The activity was carried out entirely except for the fact that implementation time was particularly short so the implementation involved mapping real processes and coding them into annotation typical of process engineering for some of the partner companies. Feeding and milking processes were considered. The work carried out is described in the project reports (deliverables) attached to this report, named as below and covering the HACCP Good Practice Critical Control Point Manual and implementation actions.

Name of descriptive report	Name of file delivered and attached
Handbook of G_HACCP for the control of critical points of technical economic and environmental management of enterprises including good practices and implementation actions	10.B.2.1 G_HACCP Manual.

- **ACTION B: Project implementation activities**

Objective B2.2: B 2.1 Implementation of integrated management plan: Definition Implementation process management plan with Lean Management approach to develop and implement a Lean management plan with the aim of streamlining production processes especially in the management of personnel and their roles.

The Lean approach made it possible to read the company's production process with advanced and newly developed management logic in the dairy sector. All the activity was carried out with the contribution of Prof. Atzori's research group, which has been developing in-house expertise on these issues for the past two years. The Lead Partner's advice to external experts on these topics has not been activated precisely because figures have recently been acquired in the UNISS team to train staff involved in Dairy Chain on these issues. In particular, Lean approach studies have been done on dairy farms with the same scheme used in other sectors (auto, manufacturing and secondary sector especially). The Lean approach was found to be a frontier topic that can be implemented only on certain companies that have particular receptivity and aptitude for process innovation.

The activity was carried out in its entirety and was concluded as planned, however, it should be noted that the activity continues on dairy farms and one sheep farm for business management with the same UNISS team proving the successful implementation derived from the project.

The activity carried out is described in the project reports (deliverables) attached to this report, named as below and concerning the Dairy Lean manual that today represents an advanced tool and almost unique in the sector.

Name of descriptive report	**Name of file delivered and attached**
Dairy Lean manual, report of mapped processes, results of implementation actions, and implementation report of improvement actions with comparison of results obtained in the 3 species of the single supply chain	10. B.2.1_Manual of G_HACCP

- ACTION C: Innovation broker

Objective C: Integration of supply chains: alignment of the project vision and harmonization of meetings by the Innovation Broker with the aim of organizing meetings and focus groups to stimulate co-creation of the organizational model in partner companies for the definition of strengths and weaknesses, opportunities and barriers of the proposed organizational model in order to improve acceptability by additional partner companies in the dissemination and dissemination phase of the project idea.

The action of the Innovation Broker was performed differently, as the planned figure was not contracted and did not perform actions for this purpose. Facilitation actions were carried out by UNISS staff in relations with partner companies and at dissemination days where youth groups and groups of farmers interested in advanced herd management were created. Five training meetings were carried out in the area covering different and emerging issues for the dairy sector.

From an operational and on-the-ground result point of view, it is considered that the cooperation objectives were achieved and in the facilitation activity played an important role the fact that the stakeholders in the territory were already strongly engaged in cooperative structures (partners' members) or had previous connections with the University and other actors in the territory (feed companies, experts and technicians, regional agencies of the Department of Agriculture). The mode chosen for the meetings made in the territory also included convivial parts where priority was given to interaction among those present and discussion of topics. The execution of training meetings in northern Sardinia and in the province of Oristano facilitated the participation of different geographical backgrounds. Particular positive feedback to the facilitation came from young breeders from Arborea, involved through their families and through the AGAFI (Giovani Allevatori di Frisona Italiana) association, who actively participated in the meetings held at the University of Sassari and stated with particular involvement that they enjoyed participating in training and dissemination meetings at the University of Sassari as the training away from the farm allowed them to take a break from the entire work day to devote themselves to following the events and focus on the days of cooperation, hoping for follow-up and upcoming meetings.

For reporting on facilitation and networking, please refer to the material collected in Action D dissemination on the following pages.

- ACTION D: Disclosure

Objective D: Dissemination of the results, the approach taken and the tools produced in the member companies and dissemination and training activities on the territory with the goal of publishing the material in the portal of the PEI AGRI (https://ec.europa.eu/eip/agriculture/en) and in the member portal of Coop. 3A, to which this final report will be aggregated in Italian and English language with the activities carried out and t h e results achieved during the project in relation to the objectives set. We propose to disseminate in the PEI the 200-page information booklet that represents the best technical summary of the project.

In addition, a dissemination and training activity was carried out at the member companies of the 3A and CAO cooperatives and a final conference. All territorial meetings were recorded and ready to be uploaded to the COOP 3A website for presentation of results at regional and national levels.

The activity was carried out in its entirety and was concluded as planned, however it should be noted that the activity continues in dairy farms and one sheep farm for the organization of thematic meetings in the territory with young farmers as proof of the successful implementation derived from the project.

The activity carried out is described in the project reports (deliverables) attached to this report, named as below and covering dissemination reporting and an information booklet, and in the following sections of publications and cooperative training meetings.

Name of the descriptive report	**Name of file delivered and attached**
Information booklet of about 200 pages with the project results for the creation of a single supply chain	12. D._DISCLOSURE BOOKLET

Publications

Scientific publications were produced as follows:

1. Podda, M. G., G. S. Sechi, G. Todde, A. Cannas, and A. S. Atzori. 2025. Optimizing Dairy Farm Efficiency: A case study in Process Mapping and Business Process Management for feeding operations. In 26thASPA Congress, June 17-20, 2025. Turin, Italy.

2. Sechi, G. S., and A. S. Atzori. 2025. A twenty-year dairy cattle farm evolution, technical and managerial aspect. In 26thASPA Congress, June 17-20, 2025. Turin, Italy.

3. Sechi, G. S., and A. S. Atzori. 2025. A twenty-year dairy cattle farm evolution, technical and managerial aspect. In 76thEEAP Annual Meeting, 25/29 August 2025. Innsbruck, Austria.

4. Podda, M. G., G. S. Sechi, and A. S. Atzori. 2025. Optimizing dairy farm efficiency: A case study in TMR feeding process mapping and cost analysis. In 76thEEAP Annual Meeting,. 25/29 August 2025. Innsbruck, Austria.

5. Podda, M. G., G. S. Sechi, and A. S. Atzori. 2025. Engineering Dairy Nutrition: A case study in Process Mapping and Business Process Management for feeding operations. In ModNut, 9/12 September 2025. Engelberg, Switzerland.

6. Sechi, G. S., M. G. Podda, and A. S. Atzori. 2025. Modeling economics of Nutritional Management: from the barn to the income statement. In ModNut, 9/12 September 2025. Engelberg, Switzerland.

- **Disclosure and educational meetings of Cooperation in the Territory**

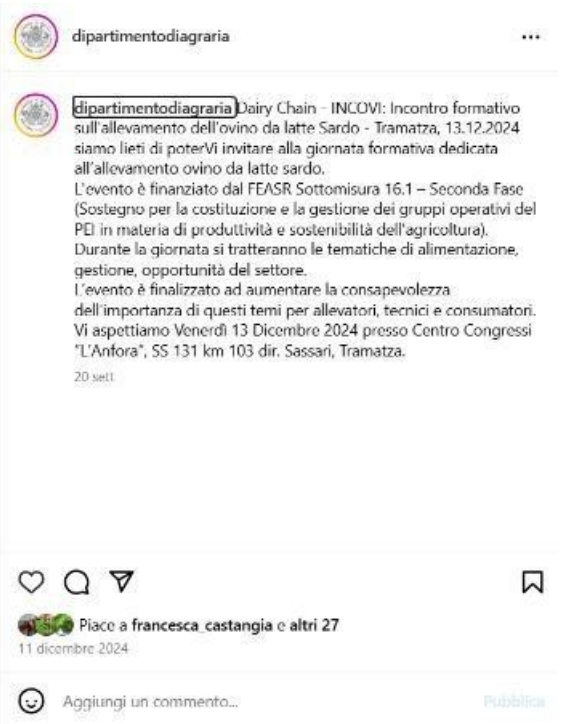
During the course of the DairyCHAIN project, six thematic conferences, including the final conference, were organized dedicated to training, technical discussion and scientific dissemination in the dairy sector. The events were promoted through the creation and dissemination of specific posters for each conference, accompanied by communication activities on social media, particularly through the Instagram and Facebook channels of the Department of Agriculture of the University of Sassari and the Animal Husbandry Section. In addition, a system of targeted email invitations was activated for each event, targeting professionals, students, livestock breeders and industry professionals. Attendance of participants was recorded during the events, and on some occasions university credits (CFUs) were awarded to students who took part in the activities. Images and materials from the conferences held were shared online to ensure wide visibility and dissemination of the content covered.

Dairy Chain - INCOVI:

Perspectives and problems of Sardinian dairy sheep farming

December 13, 2024 - Tramatza

The inaugural conference of the DairyCHAIN project, in collaboration with INCOVI, presented the first results of experiments on fattening sheep at the end of their careers and enhancing their meat through feeding strategies and processing techniques. It emerged how the use of vitamin E improves the sensory characteristics of meat, making it more attractive to the market. In addition, the issue of environmental sustainability in the sheep sector was addressed, with the introduction of LCA methodologies, carbon footprint and environmental certifications, highlighting the importance of an integrated approach to business management.

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L'Anfora
Tramatza
I pilastri della sostenibilità
Ambientale
Sociale
Economica
Centro Congressi
L'Anfora
Tramatza

DairyCHAIN:
From passion to professionalism: the farmer's journey to business growth
January 10, 2025 - Sassari

This conference explored the transition of livestock farms from family businesses to modern, structured and digitized enterprises. Professor Atzori presented the tools developed by the DairyCHAIN project to improve organization, data management and operator training. Business and legal testimonies highlighted the importance of planning, digitization and counseling to address growth and generational transition. Gian Simone Sechi's speech emphasized the urgency of introducing management control to ensure economic sustainability.


PROGETTO BABY CHAT
COLTIVARE I NUMERI PER DECISIONI CONSAPEVOLI IL CONTROLLO DI GESTIONE NELL'ALLEVAMENTO DA LATTE


Esigenze e priorità tecniche e organizzative dell'allevamento ovino, caprino e bovino da latte
Alberto Stanislao Atzori

DairyCHAIN:

The new animal husbandry: synergy between knowing and knowing how to be

February 6, 2025 - Sassari

The conference introduced for the first time the concept of *One Welfare* in academia, fostering a systemic view of animal, human and environmental welfare. Moderated by the editors of ExDairyPRESS, it hosted talks that addressed animal welfare, the multidisciplinary approach in education, entrepreneurial creativity, and the importance of inclusive and challenging work environments. The testimonies highlighted the central role of the farmer as a technical and social figure at the center of sustainability.


FEASR
FONDO EUROPEO AGRICOLO PER LO SVILUPPO RURALE: L'EUROPA INVESTE NELLE ZONE RURALI
SOTTOMISURA 16.1 - SECONDA FASE
SOSTEGNO PER LA COSTITUZIONE E LA GESTIONE DEI GRUPPI OPERATIVI DEL PEI IN MATERIA DI PRODUTTIVITA' E SOSTENIBILITA' DELL'AGRICOLTURA
PROGETTO DAIRY CHAIN
Giovedì 6 Febbraio 2025 - Aula Magna Barbieri Dipartimento di Agraria, Sassari
La Nuova zootecnia: sinergia fra sapere e saper essere
Ore 9:30 | REGISTRAZIONE partecipanti ------- Ore 10:00-12:00 | RELAZIONI tecniche
Introduzione ai lavori e presentazione progetto Dairy Chain
Prof. Alberto Atzori, Dipartimento di Agraria, UNISS
La zootecnia italiana tra sapere e saper essere- introduzione al convegno
Dott.ssa Valentina Daprà, Direttore responsabile "ExDairyPRESS"
Il ruolo del veterinario Buiatra nella zootecnia passata, presente e futura.
Dott.ssa Emanuela Sorgia, Medico veterinario
Essere imprenditrice e allevatrice ieri e oggi
Adriana Busi, Imprenditrice agrozootecnica (Borgo San Siro, Pavia)
La figura femminile negli allevamenti da latte
Associazione "QdL - Quelle Del Latte"
L'approccio della ricerca applicata nel territorio
Prof.ssa Francesca Mossa, Associato di Ginecologia Veterinaria, UNISS
One Welfare: un metodo antico per un approccio nuovo
Dott.ssa Donata Nativi, Medico veterinario
Moderano la Dott.ssa Valentina Daprà e la Dott.ssa Maria Mazzitt
12.00 | Interventi programmati e domande ed interventi del pubblico
13.00 | Chiusura evento e a seguire rinfresco
Come da ordinamento è prevista l'erogazione di CFU validi per altre attività per gli studenti afferenti ai Corsi di studio del Dipartimento di Agraria e di CFR per i Dottorandi in Scienze Agrarie indirizzo Scienze Zootecniche
Contatti
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UNISS
CAO

dipartimentodiagraria
dipartimentodiagraria DAIRY CHAIN - La nuova zootecnia: sinergia tra sapere e saper essere
Durante la giornata si tratteranno le tematiche relative al ruolo del veterinario buiatra nella zootecnia, il ruolo dell'imprenditore zootecnico, la figura della donna nell'allevamento da latte, la ricerca nel territorio e il One Welfare.
L'evento è finanziato dal FEASR Sottomisura 16.1 – Seconda Fase (Sostegno per la costituzione e la gestione dei gruppi operativi del PEI in materia di produttività e sostenibilità dell'agricoltura) ed è finalizzato ad aumentare la consapevolezza dell'importanza di questi temi per allevatori, tecnici e portatori di interesse del settore.
Ci vediamo giovedì 6 Febbraio 2025 presso l'Aula Magna Barbieri del Dipartimento di Agraria, Sassari - Viale Italia 39/A.
per tutte le informazioni: 👉 Prof. Alberto S. Atzori 👉
asatzori@uniss.it
13 sett
Piace a 20 persone
4 febbraio
Aggiungi un commento...
Pubblica


IL RUOLO DEL VETERINARIO BUIATRA NELLA ZOOTECNIA PASSATA, PRESENTE E FUTURA


DAIRY CHAIN:
Integrazione gestionale di aziende bovine, caprine e ovine da latte in una filiera unificata e sostenibile
Università di Sassari
6 Febbraio 2025


DAIRY CHAIN:

DairyCHAIN:
The national and European context of dairy farming.
February 20, 2025 - Arborea

This meeting analyzed the short- and medium-term market scenario for the dairy sector, with reference to international data and production trends. Italy's growth in efficiency and exports and the strategic role of the sheep sector were highlighted. The second part expanded on the concept of economic sustainability, emphasizing the importance of integrating technical analysis with the cultural and social dimensions of farms.

DairyCHAIN:
Nutritional efficiency in dairy farms

Feb. 28, 2025 - Arborea

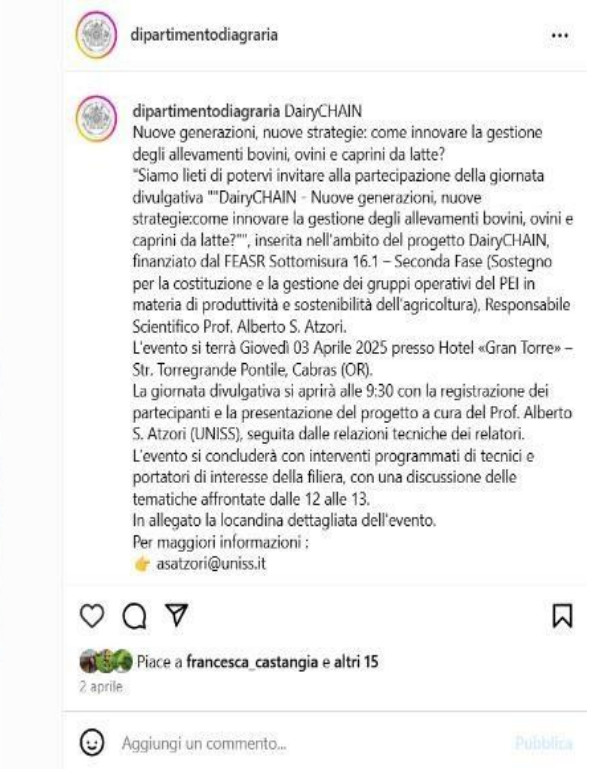
The conference explored the importance of precision nutrition and integrated feed management to improve efficiency and sustainability. Professor Atzori reiterated the centrality of data and digitization in farm management. Professor Gallo presented the risk posed by mycotoxins in forages and mitigation strategies. Professors Masoero and Formigoni brought technical contributions on nutritional models and use of technology in stables, highlighting the potential of personalized feeding to increase productivity.


Omilità e sanità degli insilati, in ottica della nutrizione di precisione
Prof. Antonio Gallo
Athens (GR)
28 Febbraio 2025


Il progetto DAIRY CHAIN

DairyCHAIN:
New generations, new strategies: how to innovate the management of dairy sheep, cattle and goat farms?
FINAL CONVENTION April 3, 2025 - Torregrande

The concluding conference took stock of the results of the DairyCHAIN project and future challenges for an integrated and sustainable supply chain. Prof. Atzori presented the tools developed for technical, economic and environmental management of farms. Emiliano Attardi (CAO Formaggi) illustrated the use of the DIGICAO platform, while Sebastiano Curreli (Latte Arborea) showed the results of the environmental certifications obtained. Lawyer Elena Gargiulo discussed the topic of generational transition and business leadership. Drs. Podda presented a business process mapping model and Dr. Azzena compared the environmental performance of different supply chains. Gian Simone Sechi closed by emphasizing the importance of management control in consolidating business efficiency and resilience.




Il progetto DAIRY CHAIN


PROGETTO DAIRY CHAIN
Indicatori ambientali
e performance aziendale
nell'agro-zootecnia


SENZA DATI SUBISCI!


Produttività e impatti a confronto in allevamenti bovini, ovini e caprini
Dott.ssa Margherita D. G. Azzena, Dott.ssa Paola Sanz, Dott. Claudio Mussolino
UNISS


I PROCESSI DELLA GESTIONE ALIMENTARE

2. ANNEX 1 TO THE TECHNICAL REPORT: CHANGES IN PLANNED ACTIVITIES AND COMMITTED PERSONNEL

Attachment 1 to the technical report provides a description and rationale for the change in staff engaged in UNISS research activities in terms of hours and costs.

The Dairy Chain project began by facing several operational difficulties that affected the progress of project activities, both in terms of timing and execution of individual planned activities. The variations are detailed in the technical report. The reasons can be attributed to several factors that occurred between the submission of the application and the determination of implementation and funding. The main one is the change of the Board of Directors of Cooperative 3A, the project leader, and the change of internal staffing arrangements and strategic objectives of support to livestock enterprises. In the same context, the difficult period of 2022 with low cattle milk prices and high food costs in which many livestock enterprises closed and others were at great risk of closure, with extreme difficulty of the project leader to allocate resources to the project and a need to change the project objectives. This change brought with it the need to eliminate the project budget that included purchase of instrumentation and external consultancy, as well as the need to equip farms with economic management software to improve profitability margins in unfavorable market situations. In addition, the exit from the project of partner Noa Solution srl resulted in the need to schedule activities related to the information model with priority on the income statement of the farms. However, these choices left the opportunity to achieve important cooperation objectives for the dairy cattle, sheep and goat sector in Sardinia as shown by the reports attached to the final technical report.

The personnel involved in project activities was initially defined as per Annex 6 and included the employment of an Associate Professor (Prof. Atzori) for about 594 hours and a full professor (Prof. Cannas) for about 365 hours. In addition to staff to be recruited for approximately 36 months of fellowship contracts for collaborators of different scientific expertise (Table 1). As a result of the need to adapt the project activities to the needs of the project team and the new structure of the lead partner, the timetable for the execution of activities was changed. At the same time, the entry of all PNRR project and other national public recruitment initiatives in recent years has resulted in extreme difficulty in recruiting qualified personnel to work on the projects, as evidenced by numerous calls for researchers and fellows that went unsuccessful in the

Sassari Department of Agriculture. These factors have led to a need to reschedule the figures committed from the UNISS side to carry out activities considering that priority has been given to the execution of technical activities and the commitment of figures as they are needed to complete them. Therefore, additional faculty were engaged to carry out the more scientifically demanding activities compared to the initial schedule and an additional number of fellows were engaged for a reduced number of monthly payments compared to what was planned to cover field activities (Table 2). Specifically, the following were employed: i) One researcher (Prof. Pais) who replaced part of the activity of the fellows for a total of 461 hours; ii) 3 Associate Professors (Prof. Atzori, Prof. Zara and Prof. Caria, for a total of 1219 hours who partly covered the activities of the senior researchers/fellows and the activities of Full Prof. originally planned), iii) two Full Professors (Prof. Cannas and Prof. Pulina, for a total of 265 hours, 100 less than originally indicated. The reason for this change is due to the fact that unplanned national PNRR projects in 2021 have committed many man-hours of faculty members from all universities, and Prof. Cannas could not devote to Dairy Chain all the hours planned, so part of his work was done by Prof. Caria and Prof. Pulina. In addition to these figures, bachelor's and master's degree fellows were recruited for a total of about 20 months of fellowships. In particular: Prof. Zara who runs the laboratory in the section of Food and Environmental Science and Technology has been engaged for the experimental activities of Action B1 and characterization of food and milk; Prof. Pais, a researcher in the area of Zooculture, with well-known experience in statistics and computer science has been engaged in the processing, editing and structure of datasets, statistical processing of experimental data and in the working groups of the preparation of information systems and data download from project app. Prof. Caria working in the Land Engineering section in the area of precision farming, has been engaged in the study of process engineering and mapping of barn operations for HCCP-like design of barn control and in Lean Management. Prof. Pulina was involved in all aspects of environmental sustainability associated with the characterization and comparison between livestock species. The hourly commitment and cost of the individual UNISS faculty and figures has been reported in Table 4 as per the initial project and in Table 5 as per the reporting, according to the criteria used in the compilation of project Appendix 6.

Table 1. Planned staff resource commitment for the Dairy Chain project as per Annex 1 of the project application.

TEACHERS	ROLE	cost	cost h	hours scheduled
Atzori Alberto Stanislao	Associate Professor	28.520,00 €	48 €	594
Cannas Antonello	Full Professor	26.645,00 €	73 €	365
Scholar 1	Scholarship	33.273,28 €		
Scholar 2	Scholarship	41.591,60 €		
Scholar 3	Scholarship	14.972,94 €		
		145.002,82 €		959

Table 2. Commitment of staff resources planned for the Dairy Chain project as per Annex 6 of the project application.

STAFF TO BE EMPLOYED	**DESCRIPTION OF PROFESSIONAL PROFILE**	**ACTIVITY CARRIED OUT IN THE PROJECT**	**N.HOURS/ DEDICATED DAYS**	**STANDARD COST.**	**STAFF COST ESTIMATE**
Personnel Research Organization, University of Sassari, Department of Agriculture	1 Researcher (Alberto S. Atzori)	Scientific manager, participation in cooperation phases (A; 100 hours), operational coordination of experimental activities (B), experimental execution in nutritional quality and technical-economic monitoring phases, and participation in lean management plan (600 hours), facilitation in collaboration with the Innovation broker	920	*31 €/hour*	Euro 28,520.00

PERSONNEL TO BE EMPLOYED	DESCRIPTION OF PROFESSIONAL PROFILE	ACTIVITY CARRIED OUT IN THE PROJECT	N.HOURS/ DEDICATED DAYS	STANDARD COST	ESTIMATED COST OF PERSONNEL
		(75 hours) and to dissemination (145 hours)			
Personnel Research Body, University of Sassari, Department of Agriculture.	1 Full Professor (Cannas Antonello)	Participation in the phases of cooperation (A; 26 hours), supervision and control of experimental activities (B), in the phases of environmental quality monitoring, and execution to the G_HACCP plan (200 hours), and in dissemination (140 hours)	365	*73 €/hour*	Euro 26,645.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Band B fellow collaborator, with at least 3 years of experience.	Performance of experimental activities (B), in the phases of data collection in farms and food samples, NIR curve calibration analysis of biological samples in the laboratory (12 months),	12 months total	*2772,77 €/month*	Euro 33,273.28

Table 3. Commitment of personnel resources as executed in the Dairy Chain project in hourly and cost summary for each committed figure.

TEACHERS	ROLE	cost	hours
Atzori Alberto Stanislao	Associate Professor	13.400,00 €	280
Cannas Antonello	Full Professor	10.220,00 €	140
Caria Maria	Associate Professor	15.072,00 €	314
Pulina Giuseppe	Full professor	9.125,00 €	125
Zara Severino	Associate Professor	30.000,00 €	625
Pais Antonio	Researcher	14.291,00 €	461
Cualbu Antonio	Scholarship	5.100,00 €	
Serra Valeria	Scholarship	5.500,00 €	
Sannia Mariano	Scholarship	4.500,00 €	
Duras Bardilio	Scholarship	5.100,00 €	
Sau Paola	Scholarship	5.100,00 €	
		117.408,00 €	1945

Table 4. Commitment of personnel resources as executed in the Dairy Chain project in summary of hours and cost, role and activities for each figure engaged as per the format required by Annex 6.

STAFF TO BE EMPLOYED	**DESCRIPTION OF PROFESSIONAL PROFILE**	**ACTIVITY PERFORMED IN THE PROJECT**	**N.HOURS/ DEDICATED DAYS**	**STANDARD COST.**	**STAFF COST ESTIMATE**
Personnel Research Organization, University of Sassari, Department of Agriculture	1 Associate professor (Alberto S. Atzori)	Scientific manager, participation in the phases of cooperation (A), operational coordination of experimental activities (B), experimental execution in the phases of nutritional quality and technical-economic monitoring, and participation in the lean management plan, facilitation in collaboration with the Innovation broker, and dissemination	280	*48 €/hour*	Euro 13,400.00

Personnel Research Body, University of Sassari, Department of Agriculture.	1 Associate professor (Maria Caria)	Scientific manager, participation in the phases of cooperation (A), operational coordination of experimental activities (B), experimental execution in the phases of nutritional quality and technical-economic monitoring, and participation in the lean management plan, facilitation in collaboration with the Innovation broker, and dissemination	314	*48 €/hour*	Euro 15,072.00
Personnel Research Body, University of Sassari, Department of Agriculture.	1 Associate Professor (Severino Zara)	Execution of experimental activities (B)	625	*48 €/hour*	Euro 30,000.00
Personnel Research Body, University of Sassari, Department of Agriculture.	1 Full Professor (Antonello Cannas)	Participation in the phases of cooperation (A), supervision and control of experimental activities (B)and dissemination	140	*73 €/hour*	Euro 10,220.00
Personnel Research Body, University of Sassari, Department of Agriculture.	1 Full Professor (Giuseppe Pulina)	Participation in the phases of cooperation (A), supervision and control of experimental activities (B)and dissemination	120	*73 €/hour*	Euro 9,125.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Researcher (Antonio Pais)	Execution of experimental activities (B)	461	*31 €/hour*	Euro 14,291.00
Personnel Research Body, University of Sassari, Department of Agriculture.	1 Scholar collaborator (Valeria Serra)	Execution of experimental activities (B)	03/12/24 to 09/04/25		Euro 5,500.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Scholar collaborator (Paola Sau)	Performance of experimental activities (B)	19/04/24 to 09/04/25		Euro 5,100.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Scholar collaborator (Antonio Cualbu)	Performance of experimental activities (B)	19/04/24 to 09/04/25		Euro 5,100.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Scholar collaborator (Bardilio Francesco Duras)	Performance of experimental activities (B)	19/04/24 to 09/04/25		Euro 5,100.00
Personnel Research Organization, University of Sassari, Department of Agriculture.	1 Scholar collaborator (Mariano Sannia)	Performance of experimental activities (B)	19/04/24 to 18/03/25		Euro 4,500.00
TOTAL PEOPLE.	**N. 11**			**Total Cost**	117.408,00 €