

*Research, Innovation, Technical Assistance,
Good Animal Production Practices and Sustainable
Development for the Dairy Agribusiness*



- Animal Production
- Forage Resources and Environment
- Dairy Agribusiness
- Animal Health and Milk Quality
- Laboratories
- Library
- Experimental Stations
- Communication and Business

Embrapa Dairy Cattle
Rua Eugênio do Nascimento, 610 – Bairro Dom Bosco
36038-330 Juiz de Fora – MG
Phone: 00 55 32 3249-4700
Fax: 00 55 32 3249-4751
URL: www.cnpqgl.embrapa.br
Email: sac@cnpqgl.embrapa.br

Organizing Commission

Jucélia da Silva Filgueiras
Ester Vilela de Andrade Gomide
Rosângela Zoccal
Leônidas Paixão Passos
Rui da Silva Verneque
Carlos Eugênio Martins

Editorial supervision and electronic editing: Leonardo Fonseca
Graphic project and cover: Marcella Fernandes Quintella Avila
Illustrations: Embrapa Dairy Cattle's collection and Humberto Nicolini

1st edition
1st printing (2009): 500 issues

12 330
P. 192

Presentation



Embrapa Dairy Cattle is a National Research Center of Embrapa (Brazilian Agricultural Research Corporation, which is coordinated by the Ministry of Agriculture, Livestock and Food Supply), with activities focused on the technical demands of the milk production chain. Embrapa Dairy Cattle's products result from the application of scientific methods and the awareness regarding the development of adequate and innovative technological processes. The research effort aims for the advancement of knowledge and the adoption of the generated technologies turns possible the increase in productivity and the improvement of the life quality of the citizen. In order to achieve its goals, Embrapa Dairy Cattle's line of action also includes important production factors, such as: rural labor, a sector for service provision, as well as other organizations associated with the dairy agribusiness, with the offering of several training courses focused on dairy farming.

The Corporation employs highly qualified personnel, who are organized into knowledge teams, as follows: 'Animal Production', 'Forage Resources and Environment', 'Dairy Agribusiness', and 'Animal Health and Milk Quality'. Besides, the support staff is properly trained and motivated so that the work is carried out in an integrated way, towards the Corporation's major objective.

Also, the infrastructure is well suited for research purposes, including two experimental stations with an area above 2,500 ha, well equipped laboratories with apparatus based on last generation developments and a library with an excellent collection on dairy farming.

For over thirty years Embrapa Dairy Cattle has released technologies with the potential to significantly increase dairy productivity in Brazil on a sustainable basis.

Presentation



Mission

To provide feasible solutions through research, development and innovation, for the sustainable development of the dairy supply chain, in benefit of the Brazilian society.

Vision

Embrapa Dairy Cattle aspires to develop into a worldwide leading institution in the generation of knowledge, technology and innovation for the sustainable development of the tropical dairy supply chain.

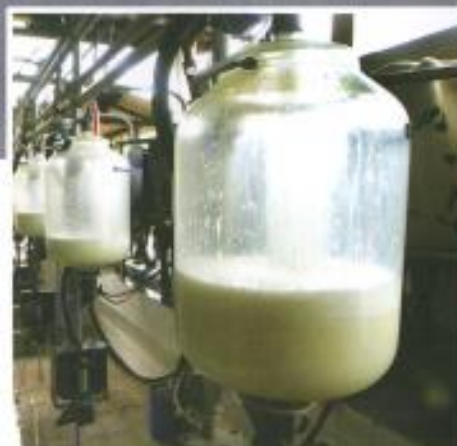
Values

- Excellence in research and management
- Social and environmental responsibility
- Ethics
- Inclusion and appreciation of diversity and pluralism
- Commitment to excellence
- Cooperation

Objectives

- To ensure competitiveness and sustainability for Brazilian dairy farming;
- To reach a new competitive technological platform in agroenergy and biofuels;
- To intensify the development of technologies for the sustainable use of biomes and the productive integration of Brazilian regions;
- To search biodiversity for the development of differentiated products with high aggregated value for the exploitation of new market segments (foods, essences, pharmaceutical drugs, biocides, phytomedicines and cosmetics);
- To contribute for the advancement of the frontier of knowledge and to incorporate new technologies, including the emerging ones.

Knowledge Teams



Embrapa Dairy Cattle's staff is organized into 'Knowledge Teams' (each including researchers, analysts and support personnel), which conduct scientific, technological and innovative research activities, adding skills, stimulating team work, promoting technical discussions, establishing work priorities, elaborating projects, and conducting research work.

Such teams are the following:

- Animal Production;
- Forage Resources and Environment;
- Dairy Agribusiness;
- Animal Health and Milk Quality.

Knowledge Team on Animal Production



Utilization of technologies, processes and practices aimed at increasing animal productivity, by means of genetic breeding and multiplication of genetically superior animals adapted to different climatic conditions.

Elaboration of diets and feeding strategies based on the evaluation of available feeds, animal racial profiles and environmental conditions.

The main lines of research are:

- Animal and environment interactions, with focus on animal welfare;
- Evaluation of diet components and nutritional strategies for maximizing production;
- Characterization and selection of superior genotypes for milk production and quality;
- Identification of genes which influence animal attributes for disease resistance and thermotolerance;
- Use of computational techniques, genomic data storing and analysis;
- Development of advanced reproductive bio techniques and their employment in production systems.

Knowledge Team on Forage Resources and Environment



The main lines of research are:

- Studies on animal-environment interactions utilizing methodologies inherent to the fields of animal behavior and bioclimatology;
- Monitoring and evaluation of the impact of dairy supply chain on the quality of water and water resources, treatment and final destination for wastes produced by the zootechnical and industrial productive processes;
- Studies of pasture production and quality under different management conditions;
- Evaluation of soil, plant and animal components in sylvipastoral systems;
- Identification and breeding strategies for forage cultivars adapted to the distinct soil and climatic conditions of Brazilian dairy basins;
- Development of intercropping systems for feed and biofuel production;
- Identification of the main aspects involved in the soil-water-nutrient interaction and their influences on forage plants in single cropping and agroforestry systems;
- Characterization of the tolerance of forage genotypes to factors of biological stress;
- Improvement of in vitro micropropagation and conservation of forage species;
- Studies of bioecological aspects, resistance mechanisms, and feasibility of alternative controlling methods for insect pests in forage crops.

The team works on the improvement of technologies associated with management, production and utilization of plant resources for the sustainability of production systems, besides the development of forage cultivars with high production, quality and tolerance.



Knowledge Team on Dairy Agribusiness



This team studies socioeconomic aspects of dairy production and the development of methods for quantifying, monitoring, characterizing, zoning and analyzing data on production.

The team also works on studying the competitive dynamics of dairy agribusiness in Brazil and monitoring the global situation, emphasizing its influences on the dairy supply chain.

The main lines of research are:

- Analysis of the competitiveness and sustainability of milk production systems;
- Study of economic and social impacts of the technologies;
- Analysis of the economic situation and market for milk and milk derivatives;
- Studies on geoprocessing and georeferencing;
- Creation of socioeconomic databases.

Knowledge Team on Animal Health and Milk Quality

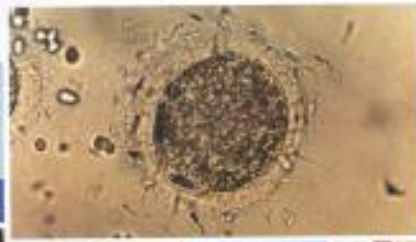


The group develops research and technologies aimed at improving milk quality and safety, and animal health, by means of field and laboratory studies. The following objectives stand out: the search for advances in knowledge to assist the improvement of public policies for the sector, the release of new technologies to make solutions feasible specially in the productive sector, and new approaches in the rural properties to ensure a competitive production of a safe and quality milk, at both the domestic and the international levels.

The main lines of research are:

- Analysis of risk factors and measures to prevent the development and spread of diseases in dairy cattle;
- Analysis of the risk profile of chemical, biological and pathogenic contaminants spread by milk and milk derivatives;
- Studies of molecular markers associated with resistance to mastitis and bovine endo and ectoparasites;
- Strategic and biological control of bovine tick and other animal health technologies for the organic milk production;
- Application of molecular methods in the study of agents of dairy cattle disease;
- Promoting the flow of the information generated by research to the farmers.

Laboratories

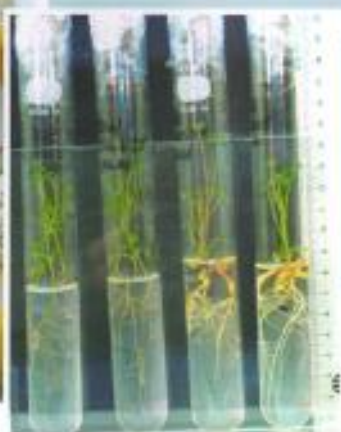


The facilities of Embrapa Dairy Cattle include laboratories which support many activities directly related to the development of our institutional research and to dissertation and thesis experimentation and also provide analytical assistance to several segments of the dairy supply chain.

Major laboratories:

- Laboratory of Feed Analysis
- Laboratory of Plant Biotechnology and Physiology
- Laboratory of Entomology
- Laboratory of Molecular Genetics
- Laboratory of Plant Genetics
- Laboratory of Milk Microbiology
- Laboratory of Rumen Microbiology
- Laboratory of Nanotechnology
- Laboratory of Parasitology
- Laboratory of Milk Quality
- Laboratory of Animal Reproduction
- Laboratory of Soil, Water and Plant

Laboratories



Laboratory of Feed Analysis

The purpose of the laboratory is to support the research actions of Embrapa Dairy Cattle and to provide services to external costumers, conducting physical, chemical and biological analyses of forage, silage, hay, concentrate, feces, and rumen fluid samples, among others. Also, the laboratory helps improving the quality of the obtained analytical data, proposing and validating new or adapted analytical methods, and improving and validating internal processes.

Laboratory of Plant Biotechnology and Physiology

Major activities are focused on the biochemical, molecular and physiological characterization of forage crops, with the purpose of assisting genetic breeding programs, germplasm conservation initiatives and pasture management studies.

Laboratories



Laboratory of Entomology

This laboratory works in support to research related to forage integrated pest management, developing institutional partnerships to intensify its participation in actions of knowledge generation and adaptation of technologies, training of students and professionals and technology transfer.



Laboratory of Molecular Genetics

The laboratory carries out activities focused on the development and utilization of molecular tools, aiming at helping increase the competitiveness and sustainability of Brazilian dairy farming.

The molecular information is utilized to:

- identify genes associated with resistance to parasites and tolerance to heat, production of milk and milk constituents, and resistance to mastitis in the various dairy races;
- certify cattle genealogy;
- identify pathogenic microorganisms in milk and milk derivatives;
- identify genes involved in the control of bovine embryo development;
- monitor the genetic diversity and genomic stability in accessions of tropical forage crops.

Laboratories



Laboratory of Plant Genetics

The laboratory supports cytogenetic analysis, polyploidization of interspecific hybrids, in vitro germplasm conservation, clonal cleaning and seed analysis. The following forage crops are analyzed: elephantgrass, alfalfa, signalgrass, guineagrass and *Cratylia*

Laboratory of Milk Microbiology

The activities are focused on research work for the identification and biological and molecular characterization of microorganisms that cause diseases in animals, milk deterioration, or which are spread through milk and pathogenic to humans.

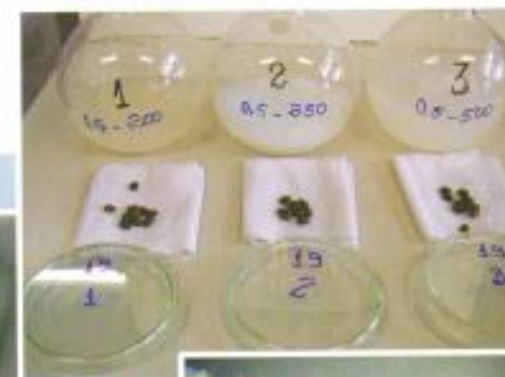
Laboratories



Laboratory of Rumen Microbiology

The activities are focused on the study of microbial ecology of the rumen in order to characterize polyphenolic compounds of interest to ruminant nutrition, aiming at generating complementary knowledge to aid the elaboration of sustainable feeding strategies, based upon tropical feeds.

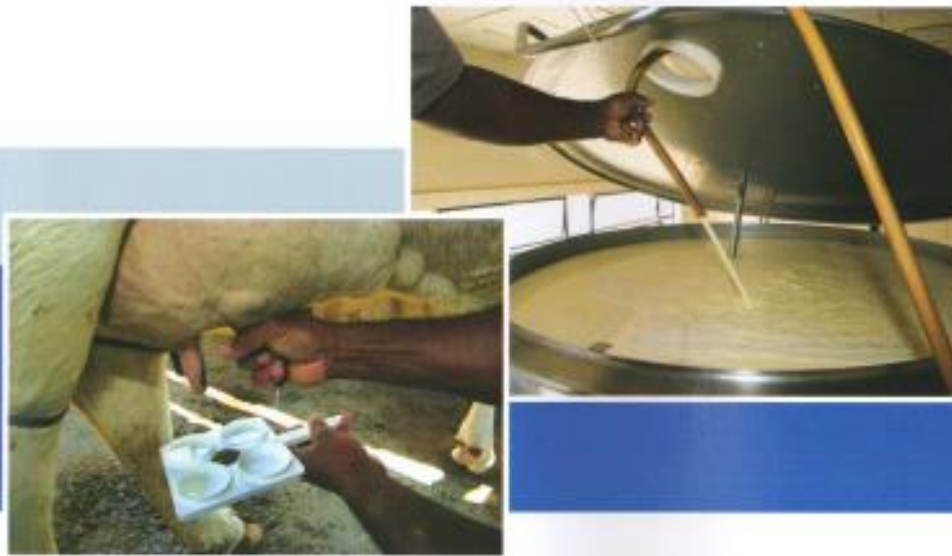
The laboratory also conducts studies on the ecology of populations of the ruminal microbiota (bacteria, protozoa and fungi), molecular phylogeny, estimation of microbial protein synthesis, and extraction and quantification of forage polyphenols (tannins).



Laboratory of Parasitology

The laboratory conducts research for the analysis of tick resistance to acaricides and studies of molecular markers associated with resistance to endo and ectoparasites and strategic and biological control of ticks. It provides a free service to farmers, by which the most suitable product for combating ticks at the level of each property is determined. From this service, the Unit keeps a database containing samples of ticks collected in various regions of the country, each one tested against the main active principles for controlling ticks, a measure which allows the team to keep updated the state of the art on bovine tick resistance to acaricides in Brazil.

Laboratories



Laboratory of Milk Quality – LQL

The laboratory carries out analyses on raw milk samples. These can be based on representative samples of the total production of the herd ("milk from the tank") or the daily production of each animal (for example, for milk production control), or in special cases, from each mammary quarter of the animal.

The performed tests are:

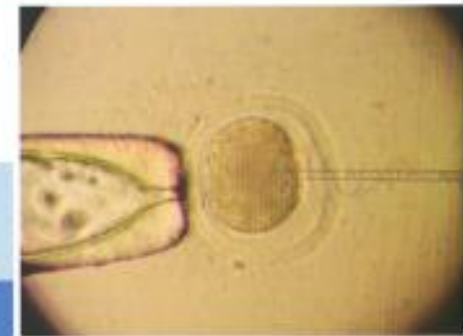
- a) Somatic cell count (CCS)
- b) Total bacterial count
- c) Determination of the concentration of fat, protein, lactose and total solids
- d) Determination of the concentration of urea
- e) Determination of the milk cryoscopic index (water addition)



The results serve different purposes:

- Evaluation of the compositional and hygienic quality of milk production;
- Assessment of the subclinical mastitis status (in the case of CCS);
- Assistance for identifying nutritional and managerial problems in the herd;
- Identification of problem animals;
- Assistance for the management of production;
- Assessment of milk tampering.

Laboratories



Laboratory of Animal Reproduction

The main purpose of the laboratory is to develop and adapt technologies that improve the reproductive efficiency and the multiplication and dissemination of bovine genotypes selected in terms of production, for assisting breeding programs and improving the economic return to dairy farmers.

The activities have the following main objectives:

- To improve the reproductive management of dairy cattle;
- To assess the adequacy of body condition scoring of taurine breeds for using in Zebu breeds and crossbreeds;
- To establish ovarian physiological characteristics in Zebu breeds;
- To improve the efficiency of in vitro and in vivo embryo production in Zebu breeds and their crossbreeds;
- To develop and adapt techniques for the preservation and sexing of gametes and embryos;
- To develop nuclear transfer techniques based on somatic cells.

Library



Inaugurated in 1975, the Homero Abilio Moreira Library is an information unit where Embrapa Dairy Cattle's documental collection is organized and stored.

The collection specializes in dairy cattle and related sciences. It holds nearly 14,000 documents, including books, periodicals, theses, pamphlets, reprints and CD-ROM discs. The service is computerized, and besides the physical collection, the online access to several databases is feasible.

The library provides services to internal and external users, works in the System of Bibliographic Exchange - COMUT and maintains interchanges with nearly 120 domestic and foreign institutions.

The library is freely accessible to the public, for indoor consultations. Also, it is possible to search titles through the Internet, by means of the Research Bibliographic Database (<http://www.bdpa.cnptia.embrapa.br>), which is part of the Embrapa Library System.

The following databases are used in the library:

CAPES PORTAL

It provides access to the full text of articles from more than 12,365 Brazilian and international periodicals, and to 126 databases. It also provides selection options for academic information sources with free access through the Internet.

EBSCO

It is an international database that allows access to 63 periodical titles which are not available in the CAPES PORTAL. Access to the texts might be performed from the library computers by any user.

BDPA

The objective of the Agricultural Research Database (BDPA) is to contribute to the use and dissemination of the agricultural information stored in the library collections of the research units of Embrapa throughout the country. It allows access to databases of the Documentary, Scientific Periodicals and Scientific Production collections of Embrapa.

E-BOOKS

The system is a source of technical-scientific information, it is accessed through the Internet, and the texts are available around the clock.

Experimental Stations



Besides its headquarters in Juiz de Fora/MG, Embrapa Dairy Cattle's facilities include the following experimental stations for field experimentation: Coronel Pacheco Experimental Station – CECP, located in the municipality of Coronel Pacheco/MG, and Santa Mônica Experimental Station – CESM, located in the municipality of Valença/RJ.

Coronel Pacheco Experimental Station – CECP

With a total area of 1,037 ha, in the CECP there is availability of areas of pastures and forage production, animals of different categories and races, laboratories and a fully compatible infrastructure to meet research demands that involve mainly field activities. In addition, there is in CECP an excellent structure for training and capacity building of technicians and farmers, and lodging facilities for trainees of the zootechnical residence.

Santa Mônica Experimental Station – CESM

With a total area of 1,678 ha, in the CESM there is availability of areas of pastures and forage production, animals and laboratories, and an adequate infrastructure for conducting research work that involves mainly field activities.

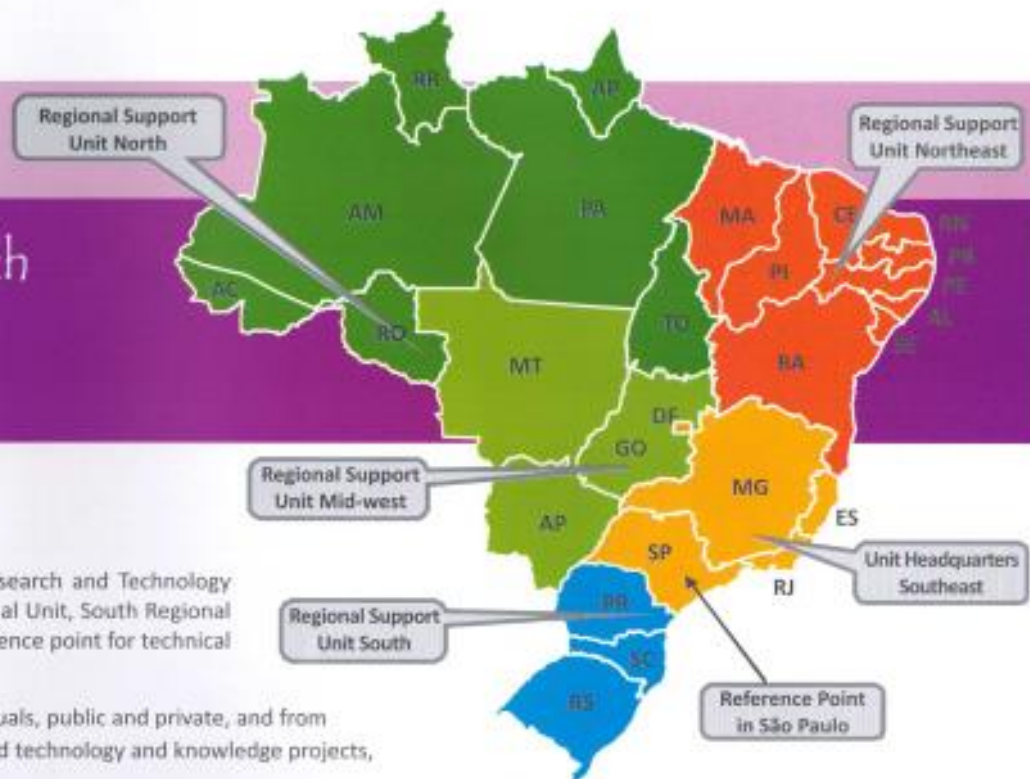
The **technologies** are the main products of the experimental stations. The milk produced, and the sale of animals, are the surpluses of the research effort.

Communication and Business

Regional Support Units for Research and Technology Transfer

Embrapa Dairy Cattle has four Regional Support Units for Research and Technology Transfer for the Dairy Sector (Northeast Regional Unit, Mid-west Regional Unit, South Regional Unit and North Regional Unit) in different states of Brazil, besides a reference point for technical activities in São Paulo. Such Units have the following objectives:

- the work, preferably in partnership, with organizations and individuals, public and private, and from the third sector, in the support and implementation of research and technology and knowledge projects, activities or actions;
- implementation of actions, directly or indirectly, to establish or strengthen the institutional relations of Embrapa Dairy Cattle;
- participation in the exploration of demands and identification of opportunities;
- work in conjunction with institutions of the dairy supply chains and their respective physiographic regions of coverage.



Communication and Business

Area of Institutional Communication – ACI



The ACI uses resources of communication to transfer technologies, knowledge and information, implementing and maintaining relationships to promote the legitimization of Embrapa Dairy Cattle with clients and society in general.



The group has the following main tasks:

- implementation of the Communication Policy of Embrapa, enabling the transfer of knowledge and technologies for the productive sector;
- coordination, implementation and supervision of the relationship of Embrapa Dairy Cattle with the media, actions of internal communication, institutional and technological campaigns, editing and production of pieces of communication, organization and participation in events;
- dissemination of qualified information, institutional publications and materials for publicizing the Unit or third parties of interest of our clients;
- establishment of communication channels with the other Embrapa and SNPA Units, with the various segments of the production chain and with the ultimate beneficiaries of the technologies and knowledge provided by the Corporation and the Unit;
- establishment and upkeep of the flow of information and mutual influence between the Unit and its various clienteles and subsidizing the definition and implementation of the policies of Embrapa, enabling the fulfillment of our mission;
- identification of topics of interest to the dairy agribusiness with the purpose of suggesting agendas for the production of articles, media reports, seminars, workshops, congresses etc.

Communication and Business

Area of Technological Innovation – AIT



Businesses are powerful instruments of technology transfer, not only because they provide better and wider distribution of a given technology, but also because they add value to it.

Therefore, the AIT is focused mainly on:

- conducting market studies to assist the activities of identification and prioritization of the needs for knowledge and technologies of the different segments of the society;
- identifying demands and proposing the preparation of research projects with potential of being marketed by the Unit or financed by external agents;
- supporting and negotiating partnerships for conducting R,D & I activities, training on technology transfer, as well as outputting and marketing products and services of interest for developing the dairy sector;
- promoting and conducting actions necessary for registering the intellectual property relative to products and processes resulting from R&D projects developed by the Unit directly or in partnership with others, as well as focusing the efforts on technological innovation, patents and registered cultivars and development of innovative technologies;
- preparing and carrying out market plans, aiming at providing and implementing the sale of consulting and advisory services, courses and theoretical and practical training, lectures, laboratory analyses and the like provided by the Unit, aiming at technology transferring.

Communication and Business

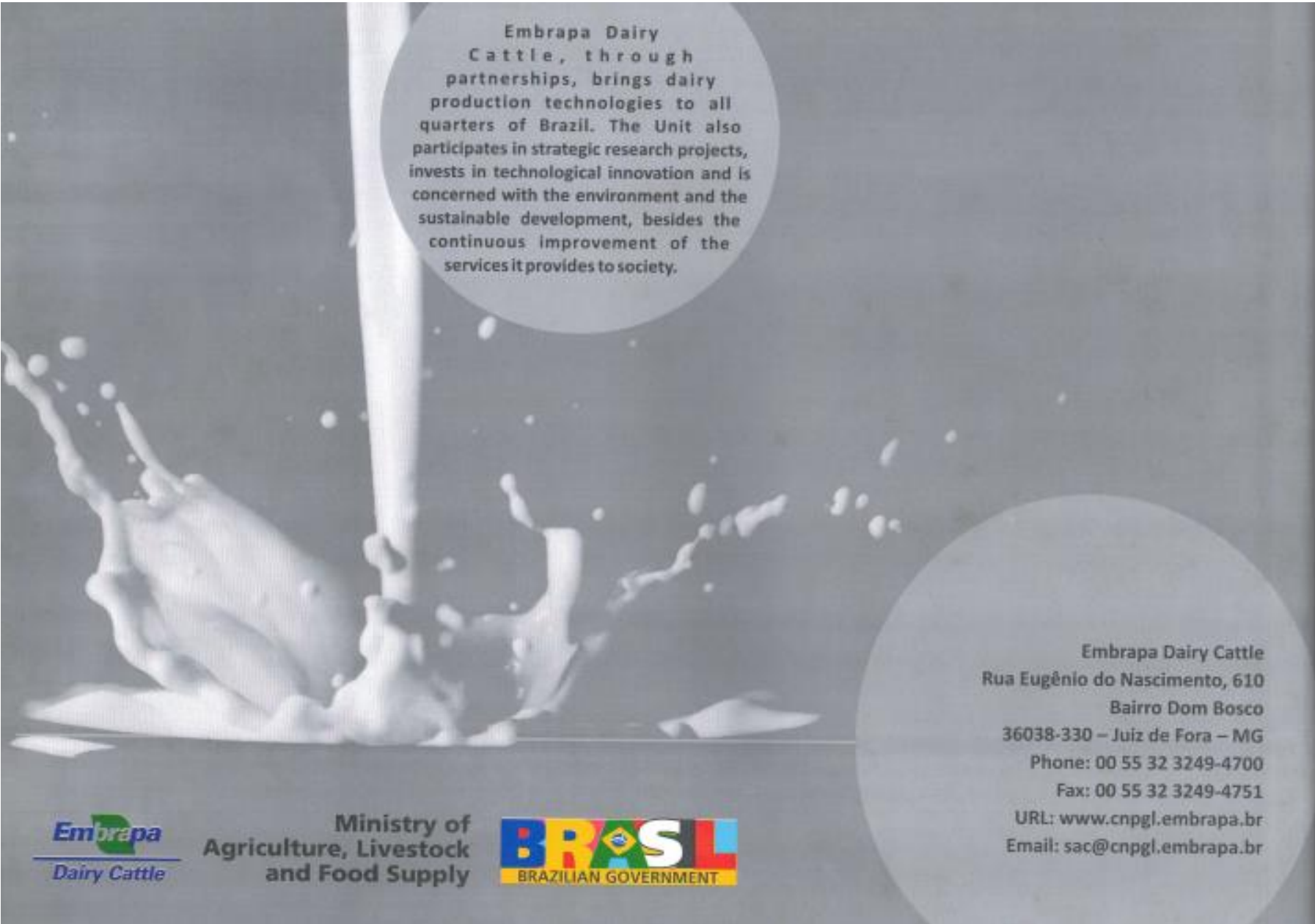
Support Unit for Technology Transfer, Training and Capacity Building - NUTTEC



The NUTTEC has the following objectives:

- to conduct training programs on dairy farming for students and technicians with a background in agrarian sciences, producers and workers of dairy farms;
- to disseminate the scientific knowledge generated by Embrapa Dairy Cattle, other Units dedicated to the dairy activity, universities and other research centers in Brazil and abroad by means of technological training and improvement of agents of technology transfer (autonomous professionals and rural extension network and private technical assistance specialists), producers and rural workers, as well as to identify demands from the various segments of the milk production chain;
- to provide users with capacity building on knowledge and technologies released by Embrapa or the Unit;
- to organize technical-scientific events of the Unit;
- to conduct training events for technicians associated with the technical assistance and rural extension, based on technologies generated by the Unit or by other research organizations;
- to coordinate the development of post-graduate theses under the advising of researchers of the Unit, supporting the retention of such trainees in their educational institutions of origin, as well as to coordinate the program of internships, courses, lectures, zootechnical residence and other events related to the activities of training people external to the institution;
- to consolidate the Unit as a reference center in science and technology for the dairy sector and to expand its interaction with the productive sector and the scientific community.

Embrapa Dairy Cattle is the only Unit of Embrapa which has a support unit specific for transfer of technologies, training and capacity building in dairy farming.



Embrapa Dairy Cattle, through partnerships, brings dairy production technologies to all quarters of Brazil. The Unit also participates in strategic research projects, invests in technological innovation and is concerned with the environment and the sustainable development, besides the continuous improvement of the services it provides to society.

Embrapa Dairy Cattle
Rua Eugênio do Nascimento, 610
Bairro Dom Bosco
36038-330 – Juiz de Fora – MG
Phone: 00 55 32 3249-4700
Fax: 00 55 32 3249-4751
URL: www.cnpqi.embrapa.br
Email: sac@cnpqi.embrapa.br

Embrapa
Dairy Cattle

Ministry of
Agriculture, Livestock
and Food Supply

