Geotraceability in agricultural chains, an urgent demand in Brazilian agribusiness

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Abstract
The demand for quality in agricultural chains has required information about the products, from the farm to
the fork. Geotraceability provides the ability of describing the history, use, and location of a product. This
paper discusses the need of storing and retrieving data within the agricultural chains (tracking), as well as
following the location of the product in real time (tracking), particularly for recall operations in case of a
crisis. Many of these tools are still to be improved, but their development will add value to products and
enhance food safety to consumers.

Keywords:
Geotraceability, agricultural chains, Brazilian agribusiness

1 INTRODUCTION
Although facing internal and external difficulties every
year, Brazilian agribusiness is responsible for
approximately 37% of the country's Gross Domestic
Product (GNP). The numbers speak by themselves :
annually, Brazil produces more than 50 million ton of soy
bean, approximately the same amount of corn, 12 million
ton of rice, 5.6 million ton of wheat, 3.2 ton of bean, and
1.7 ton of cotton seed. The country is still the world
leader in coffee production and is responsible for 80% of
the orange juice consumed in the world. Sugar cane
production is reaching 300 million ton per year and beef
exports have already surpassed Australia.

The environmental, social, and economic impacts of
agricultural expansion and intensification in Brazil
deserve attention. This paper will focus on a cutting edge
aspect related to sustainable product development,
potentially suitable for adoption in integrated production
systems, i.e. geotraceability. In particular, we consider the
need of geotraceability within the beef cattle
production chain.

The importance of such topic is related to the recent
demands and regulations taking place in countries
consuming the beef produced abroad. In particular,
geotraceability can contribute to respond to the current
European policies, strategies and action plans, such as:

- Environmental Technology Action Plan (ETAP),
which encourages developing countries to use
environmental technologies, for their potential to
improve both the environment and competitiveness; a
geotraceability system can promote new
communication technologies to provide management
tools allowing impact mitigation of beef cattle
production on natural resources and fostering best
land use practices.

In fact, the adoption of geotraceability systems can
enhance food safety and quality, providing consumers
with a level of information compatible with the demands
of a globalized market and with the need of better local
management [1] [2].

2 THE STATE OF THE ART OF GEOTRACEABILITY
IN BEEF PRODUCTION
What is geotraceability in agribusiness? It is the ability of
describing the history, the use, and the location of an
agricultural product, allowing tracing and tracking it from
its production to its consumption. Thus, it is necessary to
retrieve and store information about the characteristics
and the history of the product (tracing), as well as to
follow the real time location of the product (tracking), in
particular for recall operations in crisis situations, such as
the avian influenza.

The potential of such tools is evident to map agricultural
activities at the property level, to add value to market
products, to certification and labelling in retail business,
to communication with consumers, and to subsidize
future policies for the sector.

Geotraceability may be used to increase confidence in
products being acquired by consumers through the
knowledge of its trajectory, safety, and quality from
production to consumption. The process is carried out
through standard spatial indicators, in conformity with
defined norms, to integrate information from various
sources, quality, and scales of observation. Much has to
be improved in terms of standardization, but efforts have been made in several countries.

All these issues are associated with the availability of information and knowledge about the food chains. Research, development, and innovation will contribute effectively to this demand.

The first workshop on geotraceability in agriculture was held in Italy in 2003. The European Union has funded initiatives on traceability, some of them including a geoinformation package. In Brazil, various sectors are interested in such tools, as they may become crucial in the near future.

Embrapa Satellite Monitoring, for example, has strengthened the cooperation with University of Laval (Canada), Cemagref, and Cirad (France). Two workshops were held in 2003 and 2005 to discuss priorities for the Southern Cone - European Union relations, including opportunities for geotraceability. A partnership was established for the next few years and a general framework was designed trying to integrate spatial information with the beef production chain (Figure 1).

Some food chains are particularly important due to the emerging sanitary risks attached to international commercial relations [3]. For obvious reasons, beef is among the most important products to be tracked and traced using a spatially explicit system.

3 THE NEED OF A STEP FURTHER IN BRAZIL

Brazil already has an operational traceability system for beef cattle, the SISBOV (Brazilian System for Identification and Certification of the Bovine Sector). It includes a set of actions and procedures to characterize the origin, the sanitary condition, the production, and the productivity of beef cattle production, as well as to enhance food safety in products originated from such economic activity. In practice, the animals are identified using various devices allowing the monitoring of the production system. SISBOV is controlled by the Ministry of Agriculture, but it opened an important market, for example, to certifying businesses. The system still lacks the use of geoinformation and thus does not allow the integration of spatial information.

Through geo-referenced and product information, an improved geodecisional information system would provide verifiable facts as well as information on origin and movement of the animal, the history of its life, and adherence to production standards, enabling quality and authenticity to be guaranteed besides providing risk assessment and crises management tools for policy makers.

The step further in beef traceability is to develop and put in place an operational and integrated geodecisional system to track and trace emerging risks in beef production as well as risk management that will be acceptable, workable and usable by the scientific community and actors associated to the beef sector.

The overall goal of such system is therefore to strengthen consumer confidence through a sustainable and easily understood extensive beef production and risk management scheme, which is financially acceptable by all stakeholders. Among other goals, such system should focus on providing:

- An innovative, economically viable, spatially explicit set of methods and tools for recording accurate and reliable data on primary production practices at the farm level, including animal condition, mobility, origin, and quality;
- Cutting edge capabilities to track and trace emerging risks in beef production based on standardized, factual trace data in an easily understood and easily accessible format, and that take in account the Brazilian production context (animal mobility, number of animals, size of the farm and herd, etc.);
- Information that is acceptable, workable and usable by all actors in the beef production chain as well as for primary producers in case of a crisis event. When including retro-traceability, the system can become an important instrument for crisis management helping decision makers to limit the impact of possible crises and to facilitate the product withdrawal.

Traceability systems should satisfy the demand for methodologies and protocols needed to prevent frauds. The satisfaction of the consumer in relation to the origin and mobility of the product in the food chain is an important task. Specific or generic traceability systems based on analytical markers, aspects related to the production system, species, varieties, and geographical origin have been developed using natural or synthetic tracers. The process will be implemented in information systems allowing the authenticity checking and the quality monitoring for agribusiness products. These are cutting edge technologies that still have much to be developed, but when implemented they will:

- Add new value for primary beef producers (market value of products through better traceability, differentiation of products, management, regulations, etc.);
- Provide new services for the intermediaries that will have to track and trace cattle as well as managing risks or potential crises;
- Provide new operational tools and system for producers to follow national and international regulations.

Such geotraceability tools would gain power if embedded in a system suitable for use in environmental analysis and management (Figure 2).

4 SUMMARY

This paper summarized aspects related to the urgent demand for geotraceability tools in agricultural chains, particularly for the beef cattle sector.

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6 REFERENCES

Figure 1: Spatial information and the beef cattle production chain
Figure 2: Geotraceability and environmental management systems

Adapted from Souza, 2001 [4]