RARITA: an information system for the exchange of research and technical information on Italian animal breeds

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Abstract

In this paper we present the design and the structure of an information system for the coordination and the exchange of research and technical information on the study and preservation of biodiversity in Italian domestic animal populations and related food products.

Key words: Animal genetic resources, biodiversity, information system, Internet services, databases.

1 Introduction and economic background

In Italy a remarkable amount of rare animal breeds and stocks are present thanks to its historical background and to the wide range of different climatic environmental conditions. Some of these populations, which represent a valuable heritage of genetic resources, are endangered of extinction or are experiencing a bottleneck caused by numerical reduction. There are multiple reasons for the disappearance of these breeds: 1) the selection of only a few, highly productive breeds; 2) the substitution of animal labour with machines; 3) the growing trend of farmland abandonment that has afflicted many marginal areas, where the majority of the populations of local breeds are concentrated. The decline of agro-zoo-technical biodiversity, particularly with that of local breeds, has caused an increase in public awareness, which in turn stimulated attention for this matter amongst policy makers. Italian local animal breeds play also an important economic role: they are connected to the production of typical local food, such as cheese or meat products. Moreover recently there has also been an increase in demand for Italian typical products derived from some local breeds. A preliminary survey of typical products in Italy (Fanelli and Marino, 2001) revealed that products of animal origin (cheese, meat, animal-based preparations) number approximately one thousand, more than 40% of the total of typical products. Farm animal genetic diversity is required to meet current production needs in various environments, to allow sustained genetic improvement, and to facilitate rapid adaptation to special environment and to changing breeding objectives. In particular production efficiency in less favourable environment is closely tied to the use of local genetic types, but greater genetic uniformity has evolved in intensively raised species. Biodiversity and genetic resources conservation generate economic values, which are not captured in the marketplace. Conservation programmes are needed, given the risks of genetic erosion of these breeds. Genetic erosion may result from an insufficient population size, making it hardly sustainable in the long term, or from a high proportion of cross breeding inducing genetic dilution of the breed in a foreign genome (Drucker, A., Gomez, V. & Anderson, S., 2001).

2 User and System requirement analysis

2.1 User and goals of the system

In Italy the need for information system to be used as a tool for a more effective coordination and
exchange of information among researchers, experts, technical operators and decision makers is felt. This problem becomes even more serious owing to the complex configuration of our research system, since it is made up of three nationwide networks (Universities, Ministry of Agriculture and Forestry and National Research Council), of several Regional administrations dealing with applied research and development schemes and several independent research institutes. In such a highly fragmented context, the search for synergies becomes major problems.

The purpose of the RARITA (RAzze e Ricerche ITAliane – Italian Breeds and Research) Information System is the systematic collection of scientific and technical information related to Italian breeds in livestock production systems, starting from the bovine species. The purpose is to contribute to the protection, safeguard and valorisation of the Italian genetic resources through the coordination, the production and the spread of scientific and technological information. In perspective the system will be extended to other animal species with the realization of a specific R&D subject information system. The major target groups comprise the following categories: researchers at national and regional level; experts, technical operators; agricultural extension operators; advanced farmers and breeders, policy-makers in charge of animal genetic resources conservation, conservation groups and associations, consumers and the general public.

The main goals of the information system RARITA are:

- To provide a common place in order to exchange research, technological, development information, among the main operators;
- To facilitate the co-ordination of the activities of many independent organizations that have an interest in animal genetic resources within the broader context of sustainable agricultural and rural development.

2.2 Structure of the information system

An integrated set of databases and static web pages for the collection and the recording of the various type of information compose the RARITA information system, (see also table 1). Each database deals with a certain category of information, providing content on the following topics:

- descriptions of the animal breeds, consistence, animal selection schemes, general characterization, genetic and demographic aspects (fig.1 shows an example of these kind of data on the RARITA web site);
- scientific and technological bibliographical information, full text report literature; the full-text literature provided include working papers, research reports, conference papers, reviews, special report on development projects, statistical reports. Subject coverage includes extension papers as well as technical and economic report on animal breeds and related farming systems;
- research projects and program for conservation of farm animal genetic resources at national, regional and local level; related technical and development projects aiming to assess the role of a breed from socio-economical, cultural, and technical point of view; development activities related to increasing the value of local breeds;
- typical food products connected with Italian animal breed and related knowledge and technologies; in particular the typical livestock products with quality designations (PDO and PGI) that are designed to preserve the specificity (production is remote and scattered throughout rural areas) and the distinguishing quality of products for consumers, in many cases these products are directly linked to a particular local animal breed;
- R&D organizations and expertise, special events of interest, research facilities and resources; link to websites and other Internet resources connected with the topic of animal genetic resources conservation and improvement;
- a collection of pictures related to animal breed and traditional farming system.
### Table 1 – Database list and description

<table>
<thead>
<tr>
<th>Subject</th>
<th>Content</th>
<th>Main Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal breeds</td>
<td>Description, origin, population, risk status, performance and morphology, utilization potential</td>
<td>Herd book; Breeders association; general and special survey</td>
</tr>
<tr>
<td>Typical food products</td>
<td>Characteristics of main products of animal origin (cheese, meat, animal based preparation)</td>
<td>Ministry of agriculture; Producers association</td>
</tr>
<tr>
<td>R&amp;D projects</td>
<td>R&amp;D Project related to Livestock breeds conservation and valorization</td>
<td>General R&amp;D database; Scientific association; Regions; researchers; original survey</td>
</tr>
<tr>
<td>R&amp;D and technical Organization</td>
<td>List of main Organizations involved; research facilities and resources; external links</td>
<td>General R&amp;D database; Scientific association; Regions; researchers; original survey</td>
</tr>
<tr>
<td>Bibliographic databases</td>
<td>Bibliographic reference data of relevant literature</td>
<td>Scientific association; Regions; researchers; original survey</td>
</tr>
<tr>
<td>Report literature</td>
<td>Full text literature (format html, word, pdf)</td>
<td>Researchers; internal databases</td>
</tr>
<tr>
<td>Statistical data</td>
<td>Data on breed inventory and on related animal farming systems and products</td>
<td>Herd book; Breeders association; general and special survey</td>
</tr>
<tr>
<td>Image collection</td>
<td>Pictures of animal breed, traditional farming system</td>
<td>IBBA Original collection; private contributions</td>
</tr>
<tr>
<td>Events</td>
<td>List of relevant congress, exposition, agro fairs, special events also at regional and local level.</td>
<td>Public information</td>
</tr>
</tbody>
</table>

#### 2.3 Information Collection

One of the greatest barriers to use of Research Information Systems is the belief that they may contain information that is either of little relevance or is in an unusable format. The provision of accurate and timely information is of critical importance for the credibility of any system. In the preliminary tasks of information acquisition we have established the processes by which information will be provided in the first instance and subsequently updated. The research institutes belonging to CNR network are the main providers of the information in the RARITA system; moreover, in order to establish other channels of information flow, we have established permanent linkages with other R&D and technical Institutes mainly at regional or local level.

#### 2.4 Classification and indexing – search and navigation tools

The main key for organizing the Information in the various databases and in the web site is composed by the different breeds of livestock. At the present moment the RARITA Information system covers 32 Italian cattle breeds. In the future more species will be considered, in particular including buffaloes, sheep, goats, and swine. A global search system is available. Moreover a classification system and a glossary of scientific and technical terms are developed on an ongoing base in order to provide users with detailed key words related to the different scientific and technical aspects of relevance. The classification scheme is derived mainly from AGROVOC thesaurus. The AGROVOC multilingual agricultural Thesaurus has been developed by FAO and the Commission of the European Communities in the early 1980s and is used by AGRIS and CARIS information systems of FAO for indexing (associating the descriptors appropriate to the content of the documents referred) and retrieval since 1986. In Italy a special Italian version of the thesaurus is available (FAO, 2001; FAO, 1992)
In order to provide the users with an integrated view of the whole system, a central web server is used. Information seeking is possible using both non-analytical, intuitive browsing and analytical query based strategies. The web server provide a search tool for simple and advanced query in each single database and a friendly interface designed in order to assemble information around the main subjects: animal breeds, typical products, general problem of animal genetic resources conservation. The web site provides also an interactive collaborative environment for connecting the principal users groups, in particular a forum is set up for collecting feedback, discussion, and a special newsletter to provide news and recent information. The RARITA web will be available at the home page of the Institute of Biology and Agricultural Biotechnology (IBBA-CNR) – (www.ibba.cnr.it).

3 Conclusions

The system represents a first step for the construction of a knowledge exchange network connecting people from different area of interest (research, extension, technical expert, advanced farmers and breeders). The right technology can be implemented to support these evolving networks and entities. Information technology needs to be as flexible as the adaptive, self-organizing human networks it supports. This question, that will be addressed thought specific user study, also focuses on the detailed requirements, in particular the ease of use and the extent to which they require accurate, comprehensive and quality information.

5 References


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