REVIEW ARTICLE

Italian animal genetic resources in the Domestic Animal Diversity Information System of FAO

Giovanni Bittante

Dipartimento di Scienze Animali, Università di Padova, Italy

Abstract

The objective of this paper is to summarize the Italian Animal Genetic Resources (ItAnGR) recorded in the Domestic Animal Diversity Information System (DAD-IS) of FAO. The breed data sheets of ItAnGR were implemented by the Italian National Focal Point (ItNFP) of FAO under the guidance of Prof. Donato Matassino and CONSDABI. The impressive amount of work done is documented by 299 breed data sheets. The average level of completeness of the data sheets is 48%, i.e. a value similar to the average for European Countries, and for half of ItAnGR updating is quite regular. The number of breeds/populations included is very high for cattle (61), sheep (84), goats (54), asses (15), horses (34) and pigs (45), while it is very low for chicken (6) and absent for the other species. The level of risk of ItAnGR described in DAD-IS is worrying as about one fifth of the breeds are yet extinct, one fifth is judged critical, almost one fifth is endangered and about two fifth are not at risk, transboundary breeds included. The priority for next years is to complete and update the existing data sheets, to implement new breed data sheets for avian species, buffaloes and shepherd and hunting dogs, and to implement the new PED (Production Environment Description) module for all breeds/populations. It is evident that complete and updated database of ItAnGR is a prerequisite for the implementing of a sound National Plan of Action for the safeguarding of farm animal biodiversity.

Introduction

The Domestic Animal Diversity Information System (DAD-IS, http://dad.fao.org) is hosted by FAO (Food and Agriculture Organization of United Nations). It is a communication and information tool for implementing strategies for the management of animal genetic resources (AnGR). It provides the user with searchable databases of breed-related information and images, management tools, and a library of references, links and contacts of Regional and National Coordinators for the Management of Animal Genetic Resources (Scherf *et al*., 2008).

The DAD-IS is the centre of a global network of stand alone information systems. The national information systems of individual countries can be linked to DAD-IS network directly or, through regional (the regions, according to FAO definition, are Africa, Asia and Pacific, Europe, Latin America and the Caribbean, Near East, and North America) information systems; till now this is only the case of Europe. The network facilitates the coordination of country, regional and global efforts in AnGR management, while at the same time allowing great scope for national or regional specificities in the management and dissemination of information (Scherf *et al*., 2008).

According to FAO, the objectives of DAD-IS and the global network as a whole are (http://dad.fao.org/): to involve, coordinate and assist governments, international agencies, NGOs, training and research groups throughout the world; and help to achieve better management of all AnGR used for the production of food and agriculture in all countries, in accordance with the World Food Summit Plan of Action (FAO, 1996), the Global Plan of Action for Animal Genetic Resources (FAO, 2007a), and the UN Convention on Biological Diversity (www.biodiv.org).

The European Federation for Animal Science (EAAP, www.eaap.org) was one of the first organizations to develop a database, available on Internet, for describing and monitoring European livestock breeds (EAAP-AGDB - Animal Genetic Data Bank). Animal Genetic Resources Group of FAO developed a similar database for non-European countries, and through the European Farm Animal Biodiversity Information System (EFABIS) project, funded by European Union, the two existing information systems were merged and redeveloped in what now is DAD-IS database.

The implementation of the database is responsibility of the government-nominated National Focal Points (NFP) for the management of AnGR and DAD-IS provides NFP with a secure means to control the entry, updating and accessing of their national data. The Italian NFP (ItNFP) for AnGR was set up, organized and implemented by Prof. Donato Matassino and by CONSDABI (Matassino *et al*., 1993; Matassino, 2007). Also the data of Italian AnGR (ItAnGR) in the DAD-IS database is due to the constant and passionate work of Prof. Matassino and his collaborators.

ItNFP participates to the European Regional Focal Point (ERFP, http://www.rfp-europe.org/) for AnGR. The ERFP is the European platform, which supports the in situ and ex situ conservation and sustainable use of animal genetic resources and facilitates the implementation of FAO's Global Plan of Action for Animal Genetic Resources in Europe (FAO, 2007a).
The ItNFP national information system does not implement directly the DAD-IS database but, like many other European Countries, is connected through the regional EFABIS (http://efabis.tzv.fal.de). EFABIS includes additional data field that are not included in DAD-IS, such as those referring to *in vitro* conservation and to cultural value of AnGR.

Moreover EFABIS has developed, with the financial support of European Union, the new PED (Production Environment Description) module, which is now being implemented by FAO in DAD-IS. The PED module implementation require that NFP delineate breeds' geographical distributions, so that it can be linked to digitized maps (physical, petrologic, climatic and vegetation attributes) and enter details of the production environment that are not available through digitized maps (management, market and economical environment of a given breed). The implementation and updating of a dataset of national AnGR is a pre-

Corresponding author: Prof. Giovanni Bittante, Dipartimento di Scienze Animali, Università di Padova, Viale dell'Università 16, 35020 Agripolis, Legnaro (PD), Italy.
Tel. +39.049.8272664 - Fax: +39.049.8272633.
E-mail: giovanni.bittante@unipd.it

Key words: Biodiversity, Animal, Genetic resources, Local breeds, National focal point.

Acknowledgments: the author is indebted with Dafydd Pilling for the very useful advice in the preparation of the manuscript.
The author is Coordinator of the Italian National Focal Point FAO for Animal Genetic Resources.

Received for publication: 19 February 2011.
Revision received: 13 April 2011.
Accepted for publication: 18 April 2011.

Italian Journal of Animal Science 2011; 10:e29
doi:10.4081/ijas.2011.e29

requisite for the adoption of the *National Plan of Action for AnGR* (FAO, 2009b), as required by the approval, also by Italian Government, of the Global Plan of Action for AnGR (FAO, 2007a,b). The Plan of Action is based on 23 Strategic Priorities for Action that are grouped into four priority areas: i) characterization, inventory and monitoring of trends associated risks; ii) sustainable use and development; iii) conservation; and iv) policies, institutions and capacity building (FAO, 2007a). It is clear that a national database, within DAD-IS, is an important part of the first priority area and that it is a basic tool for the second and third (Hoffmann and Scherf, 2010). Objective of this paper is to analyze the Italian contribution to the DAD-IS database of FAO through the implemented breed data sheets of ItAnGR.

Italian Animal Genetic Resources implemented in DAD-IS database

The database is available on Internet and is organized in a *breed data sheet* for each AnGR considered. The breed data sheet is based on the following 17 sections: breed names; breed local names; images; origin and development; uses; breed qualities information; breed colors; breed morphology information; breed horns information; breed performance information; population data; organization monitoring breed; *in vivo* programs; cryo programs; publications; breed reproduction information; breed milk information (hair and wool for fiber species, eggs for avian species) and contacts. Some information referring to ItAnGR data sheets included in the database were obtained (the 6th and 7th of December 2010) through appropriate queries (breeds by species by country; status of report by country; cross table generator; breed data sheet; early warning tool; population structure and inbreeding) and analyzed with the objective of having an outlook of Italian situation. For comparison, also some data referring to major Countries, to whole Europe and to the World were recovered. The DAD-IS database is growing in size and at the end of 2010 reached 13,463 breed data sheets (including also the *transboundary* breeds, the breeds present in two or more countries). About half of the data sheets are referring to ruminant species, one fourth to mammalian monogastrics, one fourth to poultry and a small proportion of the total to camelids, game and other birds and ratites. China is the country with the highest number of breed data sheets in the DAD-IS database (663, Table 1) United Kingdom is the second (564 populations) and France the third (493). Italy is the seventh country with 299 breed data sheets, but excluding transboundary breeds it became the third with 263 local breeds. The other European countries, with more than 200 breeds registered are: Germany, Russia, The Netherlands, Ukraine and Spain. In the other continents, after China, there are Australia, Brazil, India, United States, South Africa and Indonesia. It should be considered that the high number of breeds of United Kingdom, Australia, Germany, Brazil, United States and South Africa is due mainly to transboundary breeds and not to local breeds. The first place of China is especially due to the high number of pig (150) and chicken (110) populations, which are the basic animal food for Chinese cuisines (Table 1), and the same species are the most important also in Indonesia. The other important Asian Country, India, presents a lot of ruminants breeds: the importance of cows in rural India is well known. Among the African countries, South Africa presents a high number of ruminant breeds in the database, followed by Ethiopia and Mali, but African farm animal biodiversity is probably difficult to be classified in breeds and has still to be described and registered in large proportion.

America and Oceania are characterized by a lower level of registered breeds, as the majority of farm animals present belongs to international transboundary breeds of European, Asian and African origins and their crossings. The different proportion of the farm animal species represented in DAD-IS database reflects differences in primary systems (agriculture vs pastoralism), in traditional cuisines, in climates and also in history, culture and religion. But it reflects also differences in the criteria adopted by different FAO NFP, and especially between who, like Italy, privileges the inclusion of autochthonous breeds of animals reared for agriculture and pastoralism *strictu sensu* and who consider all the populations present in the Country, included those that nowadays are reared mainly as ornamental, pets or sport animals. It seems obvious that any comparison among different countries or regions should be very cautious, taking into account these factors.

As stated before, ItAnGR reported in DAD-IS database are represented for about two thirds by ruminants and one third by mammalian monogastrics (Table 2), while avian species are almost absent. In details, Table 3 shows

Table 1. Number of breed data sheets of the major countries and their most represented species in the DAD-IS database.

Country	Breed data sheets	Most represented species	
		First	Second
China	663	Pigs	Chicken
United Kingdom	564	Chicken	Sheep
France	493	Chicken	Sheep
Australia	374	Cattle	Sheep
Germany	367	Horse	Rabbit
Russia	344	Sheep	Horses
Italy	299	Sheep	Cattle
Brazil	292	Cattle	Chicken
India	290	Cattle	Sheep
United States	282	Cattle	Chicken
The Netherland	271	Sheep	Chicken
Ukraine	245	Chicken	Cattle
Spain	227	Cattle	Sheep
South Africa	211	Cattle	Sheep
Indonesia	209	Chicken	Pigs

Table 2. Animal genetic resources described in the DAD-IS database of FAO, sorted by category.

	Italy	Europe	World
Mammalian species			
Ruminants	199	2465	6857
Monogastrics	94	1629	3052
Camelids	-	5	139
Avian species			
Poultry	6	1539	3224
Game and other birds	-	52	158
Ratites	-	8	33
Total	299	5698	13,463

that Italian buffaloes are not yet registered in DAD-IS database, even if they represent the most important buffalo population respect to the other 16 populations registered in the other European Countries. Also the other two minor ruminant species, yak and deer, are not registered for Italy despite the fact that both are present, even if in a reduced number of farms. For cattle, sheep and goat, on the contrary, the number of Italian registered populations is high, representing about 6, 7 and 16 % of European breed data sheets, respectively. The lists of registered ItAnGR of these species are reported in Tables 4 (cattle breeds), 5 (sheep breeds) and 6 (goat breeds). Also regarding the main mammalian monogastric species, the number of registered ItAnGR is high (Table 3) for horse, pig and ass, representing respectively about 5, 9 and, even, 28% of European populations of these species. The lists of registered monogastric ItAnGR are reported in Tables 7 (ass breeds), 8 (horse breeds) and 9 (pig breeds). Even in the case of mammalian monogastrics, the Italian populations of the minor species are not registered, despite the importance in our agriculture as food source (rabbits) or the use as working animals (shepherd and hunter dogs), while guinea pigs are not used as food animals like in some South American Countries. Also camelids are not registered for Italy, even if the number of Alpaca herds is slowly growing.

Table 10 shows clearly that the only Italian avian specie represented in FAO DAD-IS database is chicken, with a very low number of breeds (Table 11). Of the major Italian farm animal species, this is the only one heavily underrepresented in DAD-IS database and it is the most evident difference with the situation of Northern and Eastern European countries. Passing to minor avian species it is worth noting that ItAnGR includes also several breeds of the other poultry species like guinea fowl, turkey, duck, muscovy duck and goose not yet registered in DAD-IS. The game and other birds are much less important but still present in Italy: pigeon, quail, pheasant, partridge and also peacock, not swallow registered as agriculture animal only in Indonesia because of the use of their nests for soup production. Lastly even the ratites group of species is not registered for Italy even if ostriches are presents in several farms.

In total, of the 35 animal species of agricultural interest registered in DAD-IS database, at least 29 are present in Italy, but those registered are only the 7 mayor species, one of which with only a small proportion of existing populations.

Organization and official recognition of Italian animal genetic resources

To have a better understanding of the condition of the different ItAnGR at national level, a comparison was made between the list of breeds included by ItNFP in the DAD-IS database of FAO and the lists of breeds officially recognized by Italian Government and whose responsibility was attributed to a breeders association, and /or undergoing official milk or meat recording. The ItAnGR were classified in 5 groups: the first is composed by breeds having an official Herd Book, a selection program and a specific Breeders Association; the second group is represented by breeds with a Pedigree Registry, a conservation program and a breeders association less specific; the third group is made by the ItAnGR having no nation-

Table 3. Mammalian genetic resources described in the DAD-IS database of FAO, sorted by species.

	Italy	Europe	World
Ruminants			
Buffalo	-	16	174
Cattle	61	957	3040
Yak	-	2	27
Sheep	84	1138	2371
Goats	54	332	1183
Deer	-	20	62
Monogastrics			
Ass	15	54	189
Horse	34	745	1401
Pig	45	485	1330
Rabbit	-	305	511
Guinea pig	-	-	19
Dog	-	40	52
Camelids			
Bactrian camel	-	4	16
Dromedary	-	1	98
Alpaca	-	-	10
Guanaco	-	-	3
Llama	-	-	8
Vicuna	-	-	4

Table 4. List of Italian cattle genetic resources described in the DAD-IS database of FAO.

Cattle breeds/populations		
Abruzzese (extinct)	Grigia alpina	Pisana
Agerolese	Grigia di Val d'Adige (extinct)	Podolica
Bardigiana (extinct)	Grigia di Val di Fiemme (extinct)	Pontremolese
Bianca Val Padana	Grossetana (extinct)	Pugliese del Veneto (extinct)
Bruna Italiana	Jersey	Pustertaler Sprinzen
Bruna Vecchio Ceppo	Limousin	Reggiana
Burlina	Lucana (extinct)	Rendena
Cabannina	Marchigiana	Romagnola
Calabrese (extinct)	Maremmana	Romana (extinct)
Calvana	Modenese	Sarda
Camandona (extinct)	Modicana	Sardo Bruna
Carniella (extinct)	Mölltal (extinct)	Sardo-modicana
Charolais	Montana	Sicilian
Chianina	Oropa	Valdarno (extinct)
Chianino-Maremmana	Ossolana (extinct)	Val di Chiana (extinct)
Cinisara	Pasturina	Valdostana Castana
Demonte (extinct)	Perugina (extinct)	Valdostana Pezzata Nera
Frisona	Pezzata Rossa Italiana	Valdostana Pezzata Rossa
Frisona Italiana	Piemontese	Valtarese (extinct)
Friuli (extinct)	Pinzgauer	Varzese Ottonese
Garfagnina	-	-

al official recognition, but some local, provincial or regional organization or institution dealing with; the forth group represents extinct breeds; and, lastly, to the fifth group belong breeds not included in the previous ones. The Breeders Associations of the first two groups of ItAnGR have generally the responsibility to control and monitor the animals and supply the relevant data to the NFP. In the case of the third group of breeds the situation is much more variable and data are collected through different local organizations or institutions.

From data reported in Table 12, it can be seen that of the 61 Italian cattle breeds registered in DAD-IS database and listed in Table 4, 19 are classified as extinct, 19 have their own Herd Book organized by their specific ANA (National Association of the Breeders of the specific breed), 17 have a Pedigree Registry organized collectively by AIA (Italian Breeders Association, www.aia.it), six breeds present very incomplete data and do not have a clearly defined responsible organization or institution and need to be better evaluated. Of the 19 breeds with an officially recognized Herd Book, and thus actively selected, 6 beef and 7 dairy and dual purpose breeds are autochthonous, while 2 beef and 4 dairy and dual purpose breeds are of foreign origin. The breeds with the Pedigree registry are officially recognized and controlled, they are normally undergoing conservation plans, but they are not actively selected. Foreign breeds reared in Italy in a reduced number of farms that do not have an officially recognized Herd Book or Pedigree Registry have not been included in the database.

Of the 84 sheep breeds listed in Table 5, 17 have their own Herd Book and 38 have the Pedigree Registry (Table 12). Differently from cattle, in the case of sheep there is only one breeders association, ASSONAPA (National Association of Pastoralism, www.assonapa.com) that organizes all the Herd Books and Pedigree Registries of sheep breeds, as well as of the goat breeds (8 with Herd Book and 32 with Pedigree Registry). While 18 sheep and 1 goat (Table 6) populations are classified as extinct, there are still 11 sheep and 13 goat populations in the DAD-IS database that are not officially recognized and 4 more populations controlled by ASSONAPA not yet included in the database. Moreover, no sheep and goat breeds of foreign origin, even if officially controlled for milk or meat production, are registered in the FAO database as transboundary breeds, with the exception of some sheep breeds reared in Alto Adige-Süd Tirol province and of Saanen and Camosciata goat breeds. This fact raises some concern because we do

Table 5. List of Italian sheep genetic resources described in the DAD-IS database of FAO.

Sheep breeds/populations			
Alpagota	Cornella Bianca	Massese	Sambucana (Demontina)
Altamurana	Cornetta (extinct)	Matesina	Sampeierina
Appenninica	Corniglio	Merinizzata Italiana	Sarda
Bagnolese	Delle Langhe	Moscia Leccese	Savoiarda
Barbaresca campana	Fabrianese	Nera di Arbus	Schwarzbraune Bergschaf
Barbaresca Siciliana	Finarda	Nobile di Badia	Sciara (extinct)
Bellunese	Frabosana	Nostrana	Sopravissana
Bergamasca	Friulana (extinct)	Noticiana	Steinschaf
Biellese	Garessina	Noventana (extinct)	Tacola
Borgotarese (extinct)	Garfagnina Bianca	Paduan (extinct)	Tiroler Bergschaf
Brentegana	Gentila di Lucania (extinct)	Pagliarola	Trimeticcia di Segezia
Brianzola	Gentile di Calabria (extinct)	Pavullese (extinct)	Turchessa
Brigasca	Gentile Di Puglia	Pecora di Corteno	Tyrol Mountain
Brogne	Istriana	Pinzirita	Urbascia (extinct)
Cadorina (extinct)	Lamon	Plezzana	Valle del Belice
Carapellese (extinct)	laticauda	Pomarancina	Varesina
Carnica (extinct)	Leccese	Pusterese	Vicentina (Foza)
Ciavenasca	Livo (extinct)	Quadrella	Villonesser Schaf
Cinta (extinct)	Locale	Razza di Garessio	Vissana
Ciuta (extinct)	Maremmana (estinta)	Rosset	Zerasca
Comisana	Marrane	Saltasassi	Zucca Modenese (extinct)

Table 6. List of Italian goats genetic resources described in the DAD-IS database of FAO.

Goats breeds/populations		
Alpina	Di L'Aquila	Passeirer Gebirgziege
Argentata dell'Etna	Di Montecristo	Pomellata
Bianca Monticellana	Di Potenza	Potentina
Bionda dell'Adamello	Di Salerno	Roccaverano
Bormina	Di Teramo	Rossa Mediterranea
Camosciata delle Alpi	Frisa valtellinese	Rustica di Calabria
Capestrina	Garganica	Saanen
Capra dell'Aspromonte	Girgentana	Sarda
Capra pezzata mochena	Grigia molisana	Sarda di Tavolara
Cilentana Fulva	Istriana	Sarda Primitiva
Cilentana Grigia	Jonica	Screziata
Cilentana Nera	Lariana o Di Livio	Sempione
Ciociara Grigia	Maltese	Val Di Livo (extinct)
Delle Tremiti	Messinese	Valdostana
Derivata di Siria	Napoletana	Valfortorina
Di Benevento	Nera dei nebrodi	Valgerola
Di Campobasso	Nicastrese	Vallesana
Di Cosenza	Orobica o Valgerola	Verzaschese

Table 7. List of Italian ass genetic resources described in the DAD-IS database of FAO.

Ass breeds/populations	
Asino Albino	Cariovilli (extinct)
Asino dell'Amiata	Grigio viterbese (extinct)
Asino dell'Asinara	Martina Franca
Asino di Pantelleria, Pantesco	Ragusano
Asino Grigio Siciliano	Romagnola (extinct)
Asino Sardo	Romagnolo
Asino Sardo Grigio Crociato	Sant'Alberto (extinct)
Baio Lucano	-

not have a complete overview of the AnGR present in the Country. Moreover we should also take into account that some proposed indicators of animal biodiversity are based on the ratio between native and non native populations present in a territory (FAO, 2010g): it is evident that this kind of indicators will be biased if populations of foreign origin are not registered.

Concerning mammalian monogastrics, from Table 12 it can be seen that 9 horse breeds, among those listed in Table 8, have their official Herd Book and breeders association, while 15 horse breeds and 7 ass breeds (Table 7), are controlled by AIA which organizes their Pedigree Registries. The extinct populations are 4 for ass and 2 for horse, while the populations not officially recognized by Italian Government are 4 and 7 for ass and horse. With only two exceptions, the equine breeds of foreign origin reared in Italy are not yet included in the database.

In the case of pig, the situation, from the organizational point of view, is similar to sheep and goat; i.e. only one breeders association, ANAS (National Breeders Association of Swine, www.anas.it), hold the Herd Books of 4 breeds, all of foreign origin and widely reared in Italy, and the Pedigree Registries of 6 autochthonous pig breeds and 3 foreign breeds. Moreover, still 10 native populations included in the database (Table 9) have no official recognition (some of them are synonymous), and half of the total, are declared extinct.

For other minor mammalian species and for all avian species there are several breeders associations, sometime officially recognized, but no Herd Book or Official Registry approved by Italian Government. The only exceptions are buffalo and rabbit, both with breeders associations and recognized Herd Books.

Evaluation of data available and of level of risk of Italian animal genetic resources

The breed data sheets are not reporting all data required and sometime are reporting only few data, but the data sheet structure is very detailed, perhaps too. The average rate of completeness of Italian breed data sheets is 48%, which is very close to the average for all European countries (47%). More interesting is to focus on the availability and on the updating of population data. The knowledge of the numerical trend of population is essential for the evaluation of the risk of losing variability and of extinction of the AnGR, but also for the developments of new indicators of genetic diversity of domesticated animals (FAO,

Table 8. List of Italian horse genetic resources described in the DAD-IS database of FAO.

Horse breeds/populations	
Avelignese	Delta
Avelignese Tradizionale	Italiano da Sella
Calabrese	Lipizzano
Cavallino di Monterufoli	Maremmano tradizionale
Cavallo Agricolo Italiano	Napoletano
Cavallo anglo-arabo-sardo	Persano
Cavallo Bardigiano	Pony dell'Esperia
Cavallo Del Catria	Pugliese (extinct)
Cavallo della Giara	Puro Sangue Orientale
Cavallo Del Ventasso	Quarter Horse
Cavallo Maremmano	Salernitano
Cavallo Murgese	Samolaco
Cavallo Norico	Sanfratellano
Cavallo Pentro	Sarcidano
Cavallo Sardo	Tolfetano
Cavallo Siciliano	Trottatore Italiano
Cremonese (extinct)	-

Table 9. List of Italian pig genetic resources described in the DAD-IS database of FAO.

Pig breeds/populations		
Abruzzese (extinct)	Fumati (extinct)	Nero Siciliano
Apulo Calabrese	Gargano (extinct)	Parmigiana Nera
Basilicata (extinct)	Garlasco (extinct)	Perugina (extinct)
Bastianella (extinct)	Hampshire	Pietrain
Bergamasca nera	Lagonegrese (extinct)	Pugliese
Borghigiana (extinct)	Landrace Belga	Reggitana (extinct)
Casertana	Landrace Italiana	Riminese (extinct)
Catanzarese (extinct)	Large White	Rossa modenese (extinct)
Chianina (extinct)	Macchiaiola Maremmana	Samólaco (extinct)
Cinta Senese	Mora Romagnola	San Lazzaro (extinct)
Cosentina (extinct)	Murgese (extinct)	Sarda
Duroc	Napoletana Fulva	Siciliano
Faentina (extinct)	Nero dei Lepini	Spotted
Forlivese (extinct)	Nero dei Monti Dauni merid.	Suino Nebrodi e Madonie
Friulana nera (extinct)	Nero Reatino	Valtellina (extinct)

Table 10. Avian genetic resources described in the DAD-IS database of FAO, sorted by species.

	Italy	Europe	World
Poultry			
Chicken	6	1103	2315
Guinea fowl	-	10	64
Turkey	-	90	179
Duck	-	161	363
Muscovy duck	-	10	50
Goose	-	165	253
Game and other birds			
Pigeon	-	32	72
Quail	-	12	52
Pheasant	-	5	18
Partridge	-	3	13
Peacock	-	-	1
Swallow	-	-	1
Ratites			
Ostrich	-	5	22
Emu	-	1	5
Cassovary	-	1	2
Nandu	-	1	3
Chilean tinamou	-	-	1

2010g). The availability and completeness of population data is important also for achieving some of the strategic goals defined by Aichi Biodiversity Targets for 2020 (CBD, 2010). From Table 13 it can be seen that the completeness of the population data for ItAnGR is good as about half of the breeds has an almost regular updating of data and only 30%, excluding the extinct breeds, has no or limited data available. The availability is quite high for ass, horse and goat breeds, average for cattle and sheep, poor for pigs and episodical for chicken breeds. This means that for much of the ItAnGR it is possible to estimate short time trends of the population and also the inbreeding coefficient. The frequency of updating depends mainly from the organization and collaborative aptitude of the association or institution (if it does exist) in charge of the monitoring of the breed; but, in any case, CONSDABI has done a heavy work to contact institutions and to collect the data.

From population data recorded in DAD-IS database it is possible to estimate the level of risk of AnGR (FAO, 2010i; Pilling, 2010). The data of Italian populations are summarized in Table 14. As it can be easily seen, the situation is really worrying as more than one fifth of ItAnGR included in DAD-IS database are yet extinct. Moreover, one fifth of populations are in critical conditions, i.e. heavily at risk of extinction. Slightly less than one fifth of ItAnGR are endangered. Finally, slightly more than one third of ItAnGR are classified as not at risk. It should be considered that almost all the transboundary breeds are not at risk and that only slightly more than one fourth of Italian local breeds are in this category.

Conclusions

Regarding ItAnGR included in DAD-IS database, the priority of work is to complete and update the existing almost 300 breed data sheets. Moreover it is necessary to integrate the database with several non-native breeds of the main species reared in the Country and add data on minor mammalian species - particularly buffaloes, rabbits and some dogs. In the field of avian species there is the necessity to create a completely new database as the few breeds registered (6 chicken breeds) represent a negligible part of the wide avian genetic resources reared in Italy. Beyond the existing structure, FAO is integrating the completely new PED (production environment description) module of the database that can become an important tool for a better knowledge and representation of the AnGR (FAO, 2010e; Hoffmann, 2010), but that will require a lot of work to obtain the relevant data and to implement them for all breeds.

It is clear that such a heavy task requires cooperation among many passionate scientists and technicians and that the Italian Government, but also local governments, breeders associations, foundations and privates that, all together, are the stakeholder network of Italian AnGR (FAO, 2010c). All these actors have the moral responsibility to implement and coordinate, with ItNFP, the activities finalized to reach such important objectives. This is the great problem of ItAnGR: there is a lack of programming, coordination and monitoring. The situation is also complicated by the fact that, beyond the role of national government, the politics for farm animal biodiversity are projected and implemented separately by the different regional governments. From the point of view of the conservation of ItAnGR, the really worrying situation of our autochthonous populations requires a rapid implementation of the National Plan of Action, with a strong coordination among all the actors of the Plan, but the National Plan of Action is still far from being approved. This fact is even more worrying, bearing in mind

Table 11. List of Italian chicken genetic resources described in the DAD-IS database of FAO.

Chicken breeds/populations
Ancona
Livorno
Padovana
Polverara-Schiatta
Siciliana
Valdarno

Table 12. Italian genetic resources described in the DAD-IS database of FAO, according to specie and type of registration available.

	Herd Book	Pedigree Registry	No Registry	Extinct	Others	Total
Cattle	19	17	3	19	3	61
Sheep	17	38	11	18	(4)	84
Goats	8	32	13	1	-	54
Ass	-	7	4	4	-	15
Horse	9	15	7	2	1	34
Pig	4	9	10	22	-	45
Chicken	-	-	6	-	-	6
Total	57	118	54	66	4	299

Table 13. Italian genetic resources described in the DAD-IS database of FAO, according to availability of population data for the period 2001-2009.

	Extinct	No data	1 year	2-3 years	4 or more years	Total
Cattle	19	5	4	4	29	61
Sheep	18	5	3	12	46	84
Goats	1	8	4	7	34	54
Ass	4	-	-	-	11	15
Horse	2	7	1	3	21	34
Pig	22	4	4	9	6	45
Chicken	-	6	-	-	-	6
Total	66	35	16	35	147	299

Table 14. Italian genetic resources described in the DAD-IS database of FAO, according to level of risk and specie.

	Critical	Endangered	Extinct	Not at risk	Unknown	Total
Cattle	9	5	19	27	1	61
Sheep	15	15	18	33	3	84
Goats	13	12	1	25	3	54
Ass	6	5	4	-	-	15
Horse	9	9	2	11	3	34
Pig	8	5	22	10	-	45
Chicken	-	3	-	3	-	6
Total	60	54	66	109	10	299

that all Countries will be soon called to show to the international community the first results obtained in comparison with those planned (FAO, 2007a-c; FAO, 2010h). In particular it is important going on with the surveying activity (Tixier-Boichard *et al*, 2008; FAO, 2010f,h,i) and with the characterization of ItAnGR at genetic/genomic (FAO, 2010d), phenotypic (FAO, 2010e), environmental and, also, cultural level (Gandini and Villa, 2003). For the *ex situ* conservation, the priority goes to the activation of a virtual cryobank (FAO, 2010b; Duchev *et al*., 2010) that manages all the information belonging to the different physical cryobanks existing in Italy (genetic centers, breeders associations, A.I. studs, research centers, etc) as outlined by Pizzi *et al*., 2009. For in situ conservation, the priority goes to an efficient and coordinated conservation activity (Nimbkar *et al*., 2008; Woolliams *et al*., 2008; FAO, 2010a), including the promotion of the ItAnGR and the valorization of their products, also for environmental protection, landscape preservation and tourism exploitation (Rege, 1999; Gandini *et al*., 2010; LPP *et al*., 2010). The relationships between DAD-IS database and all activities involved in ItAnGR characterization, monitoring, conservation and valorization are very important. First of all because DAD-IS should give the information needed for establishing priorities and for correct projecting of specific actions. The second reason is that the information obtained through those actions should implement DAD-IS in a virtuous circular process. It is of fundamental importance that information raised in Italy on AnGR will not remain closed in some office or some library, but that become easily available, through DAD-IS, for the national and international communities. The availability of relevant and updated information is vital also for international reporting obligation and for collaboration with other countries. It is evident that ItAnGR cannot be saved only in terms of genes, within liquid nitrogen tanks, but exploiting the complex of economical, environmental and cultural values they represent, and this objective is obtainable only if their breeders will be preserved (FAO, 2009a). For this reason a change in mentality by scientists, technicians and politicians is needed, with the abandon of a culture based merely on productivity and standardization of products. So, an efficient protection can be established only involving all the stakeholders with a *from field to fork* approach. This is a heavy task, that requires knowledge and coordination, but that should be accomplished, bearing in mind that *biodiversity is life, biodiversity is our life*.

References

Convention on Biological Diversity, 2010. Decision no. X/2 The strategic plan for biodiversity 2011-2020 and the Aichi biodiversity targets. Nagoya, Aichi Prefecture, Japan. Available from: http://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.pdf

Duchev, Z., Groeneveld, E., Henning, M., Lichtenberg, H., 2010. CryoWEB, user's guide and reference manual. Applications in Biodiversity Informatics. Institute of Farm Animal Genetics, Friedrich Loeffler Institute, Neustadt, Germany. Available from: ftp://ftp.tzv.fal.de/pub/ cryoweb/doc/cryoweb_manual.pdf

FAO, 1996. Rome declaration on world food security and world food summit plan of action. FAO Corporate Document Repository, Roma, Italy. Available from: http://www.fao.org/docrep /003/w3613e/w3613e00.HTM

FAO, 2007a. Global plan of action for animal genetic resources and the Interlaken declaration. FAO, Roma, Italy. Available from: ftp://ftp.fao.org/docrep/fao/010/a1404e/a1404e00.pdf

FAO, 2007b. Report of the International Conference on animal genetic resources for food and agriculture, Interlaken, Switzerland. FAO, Roma, Italy. Available from: http://www.fao. org/ag/againfo/programmes/en/genetics/documents/Interlaken/Final_Report_en.pdf

FAO, 2007c. The state of the world's animal genetic resources for food and agriculture. FAO Corporate Document Repository, Roma, Italy. Available from: http://www.fao.org/docrep/010/a1250e/a1250e00.htm

FAO, 2009a. Livestock keepers – guardians of biodiversity. Animal Production and Health Paper No. 167. Roma, Italy. Available from: ftp://ftp.fao.org/docrep/fao/012/i1034e/i1034e.pdf

FAO, 2009b. Preparation of national strategies and action plans for animal genetic resources. FAO Animal Production and Health Guidelines No. 2. Roma, Italy. Available from: ftp://ftp.fao.org/docrep/fao/012/i0770e/i0770e.pdf

FAO, 2010a. Breeding strategies for sustainable management of animal genetic resources. FAO Animal Production and Health Guidelines No. 3. Roma, Italy. Available from: http://www.fao.org/docrep/012/i1103e/i1103e.pdf

FAO, 2010b. Draft guidelines for the cryoconservation of animal genetic resources. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/docrep/meeting/021/am136e.pdf

FAO, 2010c. Draft guidelines on developing the institutional framework for the management of animal genetic resources. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/docrep/meeting/021/am137e.pdf

FAO, 2010d. Draft guidelines on molecular genetic characterization. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/docrep/meeting/021/am135e.pdf

FAO, 2010e. Draft guidelines on phenotypic characterization. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/docrep/meeting/021/am134e.pdf

FAO, 2010f. Draft guidelines on surveying and monitoring of animal genetic resources. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/docrep/meeting/021/am133e.pdf

FAO, 2010g. Report of a workshop on indicators to measure trends in genetic diversity of domesticated animals. Roma, Italy. Available from: http://www.fao.org/ag/againfo/ programmes/en/genetics/documents/ITWG_AnGR_6/indicator_report.pdf

FAO, 2010h. Results of informal surveys on progress in country implementation of the Global plan of action for animal genetic resources. Commission on genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/ docrep/meeting/021/am138e.pdf

FAO, 2010i. Status and trends of animal genetic resources – 2010. Commission on

genetic resources for food and agriculture. Intergovernmental technical working group on animal genetic resources for food and agriculture, 6th session. Roma, Italy. Available from: http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG_AnGR_6/CGRFA_WG_AnGR_6_10_inf_3.pdf

Gandini, G.C., Villa, E., 2003. Analysis of the cultural value of local livestock breeds: a methodology. J. Anim. Breed. Genet. 120:1-11.

Gandini, G., Avon, L., Bothe-Wilhelmus, D., Bay, E., Colinet, F. G., Choroszy, Z., Diaz, C., Duclos, D., Fernandez, J., Gengler, N., Hoving-Bolink, R., Kearney, F., Lilja, T., Maki-Tanila, A., Martin-Collado, D., Maurice-van Eijndhoven, M., Musella, M., Pizzi, F., Soini, K., Toro, M., Turri, F., Viinalas, H., Hiemstra, S.J., 2010. Motives and values in farming local cattle breeds in Europe: a survey on 15 breeds. Animal Genetic Resources 47:45-58.

Hoffmann, I., 2010. Climate change and the characterization breeding and conservation of animal genetic resources. Anim. Genet. 41:32-46.

Hoffmann, I., Scherf, B., 2010. Implementing the Global plan of action for animal genetic resources. Anim. Genet. Res. 47:1-10.

LPP, LIFE Network, IUCN–WISP, FAO, 2010. Adding value to livestock diversity – Marketing to promote local breeds and improve livelihoods. FAO Animal Production and Health Paper. No. 168. Roma, Italy.

Matassino, D., 2007. Il ruolo del National Focal Point. pp 1-13 in Proc. Conf. on the Suino Nero Siciliano, 6th Int. Symp. on Mediterranean Pig, Messina, Italy.

Matassino, D., Capuccio, A., Grasso, F., Palazzo, M., 1993. Conservation of animal germoplasm at risk of extinction in Italy: the centre for the defense of animal genetic resources of Circello. Anim. Genet. Res. 12:25-44.

Nimbkar, C., Gibson, J., Okeyo, M., Boettcher, P., Soelkner, J., 2008. Sustainable use and genetic improvement. Anim. Genet. Res. 42:49-69.

Pilling, D., 2010. Threats to animal genetic resources for food and agriculture – approaches to recording, description, classification and analysis. Anim. Genet. Res. 47:11-22.

Pizzi, F., Turri, F., Gliozzi, T., Sandionigi, M.L., Gandini, G., 2009. Building the Cryobank of Lombardia Farm Animal Genetic Resources: preliminary results. pp 125-128 in Proc. 44th Int. Symp. Animal Production, Milano, Italy.

Rege, J.E.O., 1999. Economic valuation of animal genetic resources. Proc. FAO/ILRI Workshop, FAO Publ., Roma, Italy.

Scherf, B., Inamura, M., Wieczorek, M., 2008. Domestic animal diversity information system – a clearing house mechanism. Mainstreaming Biodiversity Issues into Forestry and Agriculture. Proc. 13th Meet. of the Subsidiary Body on Scientific, Technical and Technological Advice, Roma, Italy, CBD Technical Series 34:91-93.

Tixier-Boichard, M., Ayalew, W., Jianlin, H., 2008. Inventory, characterization and monitoring. Anim. Genet. Res. 42:29-47.

Woolliams, J.A., Matika, O., Pattison, J., 2008. Conservation of animal genetic resources: approaches and technologies for in situ and ex situ conservation. Anim. Genet. Res. 42:71-89.