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Editorial - Agricultural policies and farm animal biodiversity in Europe

Agricultural policies and the existence or lack of specific measures to protect biodiversity greatly influence the state of farm animal genetic resources.

In the last 20-30 years, the global demand for animal products has been growing rapidly, especially in developing countries. Between the early 1980s and the late 1990s, total meat and milk consumption in the developing world grew at 6 and 4 percent per annum, respectively (FAO, 2007). This increase in global demand is caused by rapid changes in eating habits of newly urbanized populations, and the increase in purchasing power in developing countries with large populations, such as India, China and Brazil. Traditional animal farming systems could not meet the growing demand. The intensification of production and the rapid spread of homogenous large-scale intensive production as a response to the growing market demand, stimulation of the import of exotic breeds and indiscriminate cross-breeding with local breeds lead to the extinction of a number of local and locally adapted breeds.

In Europe, the process of transformation of animal farming from medium to high input production systems has almost been completed. During the history, Europe and Caucasus have lost over 400 breeds of farm animals. In addition, at the beginning of this century, 28 percent of mammalian and 49 percent of avian breeds have been classified as at risk of extinction. In the late nineties of the last century the growing awareness of the European public questioned the established patterns of economic development affecting environment and biodiversity as a base for the existence of future generations. In the livestock sector, policy makers and animal scientists developed a system, which, to a

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large extent, reconciles the two opposite objectives - profitable animal production and protection of environment and biodiversity. The system included also the establishment of new and strengthening of the existing conservation programmes based on **public awareness and support, public and private - charity - funding and institutional framework**. An important element of the institutional framework are National Coordinators for AnGR which monitor and coordinate conservation programmes at national level and ensure regional and international cooperation.

In 2007, FAO reported that functional conservation programmes existed in 33 European countries covering 137 breeds of cattle, 175 sheep, 51 goat, 47 pig and 113 horse breeds. In 19 countries there were cryoconservation programmes preserving semen of bulls, rams, bucks, boars and stallions, and embryos of cattle, sheep, goat and pigs. In some countries, conservation programmes are closely related to a variety of other compatible projects, such as **protected areas and landscapes and natural parks**.

In the European Union, policy measures developed and applied within the Common Agricultural Policy (CAP) resulted in self-sufficiency and export surpluses of animal products. Although, in general, intensification of animal production has been accompanied by the loss of biodiversity, some of CAP measures such as premiums for milk, beef and small ruminants as well as milk quotas were supportive of maintenance of local less productive breeds by providing additional income to farmers keeping these animals. Since its establishment in 1962, the CAP has undergone numerous changes, adapting its objectives and instruments to changing European and global conditions. The first major CAP reform took place in 1992, involving reduction of prices and provision of direct aids to farmers, rural development and environmental protection measures, and market-related issues. The second major reform followed in 1999 under the 'Agenda 2000' and dealt with such issues as the market orientation and competitiveness of agricultural products, more environmental considerations, a comprehensive rural development policy, simplification of legislation, and food quality and safety. The most recent CAP reform in 2003 is based on the necessity to further adapt EU agriculture to the ongoing developments in the global environment and in the structure of the EU itself. The challenges to face include growing public concern about food safety, environmental preservation, farm income, and sustainable development, in the context of an ever-larger European Union and an ever-demanding international trade setting. The 2003 CAP reform eliminated the milk premium, re-structured subsidies for beef breeds and sheep and goats and introduced a system of single payment based on historic records of payments received by a farm within support provided from the EU funds

In 1998, the Community adopted a **biodiversity strategy**. Four **biodiversity action plans** were adopted under this strategy in 2001 (conservation of natural resources, agriculture, fisheries, economic and development cooperation). Today, nature and biodiversity are one of the four priorities of the Sixth Community Environment Action Programme 2002-12. The EU Council (Regulation 1698/2005) ensured payment of € 200,00 per livestock unit for support of local breeds in danger of being lost to farming. EU criteria for support across all Member States include limits of number of animals to be covered by payment. These criteria are higher than those defined by FAO for endangered breeds and breeds under risk. The status and conservation of farm animal genetic resources (AnGR) is



monitored at EU level through reports on biodiversity. The progress evaluation regarding the Action Plan is supported by a series of indicators which have been developed in the context of the project 'Streamlining European 2010 Biodiversity Indicators' (SEBI 2010). There are 26 indicators, among which, livestock genetic diversity.

National Coordinators for AnGR in the EU Member States in assessing the efficiency of the EU conservation policies underlined that population data calculated yearly are showing improvement of effective population size, that some breeds under conservation are developing marketing concepts and/or special niche products to make the transition to self-sustaining breeds without support for conservation and that some breeds are used more and more used for non-productive purposes such as protection of the environment. With regard to the impact of the CAP reform on conservation programmes, the flexibility in the implementation of the reform in the beef sector will reduce negative consequences on biodiversity of beef cattle. The announced abolition of milk quotas will not have major negative effects on biodiversity of dairy cattle.

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- European Regional Focal Point for Animal Genetic Resources. Questionnaire sent to ERF National Coordinators in April 2008. Replies received (in chronological order) by: Beate Berger (Austria), Serge Massart (Belgium), Christos Papachristoforou (Cyprus), Vera Matlova (Czech Republic), Tamás Szobolevszki (Hungary), Sipke



Joost Hiemstra (The Netherlands), Elzbieta Martyniuk (Poland), Ladislav Hetenyi (Slovakia), Drago Kompan (Slovenia), Eva-Marie Stålhammar (Sweden), Helle Annette Palmø (Denmark), Asko Maki Tanila (Finland), Frank Begemann (Germany), Andreas Georgoudis (Greece), Helen McCann (Ireland), Dainis Rungulis (Latvia) and Horia Grosu (Romania).

Article of the month - Is crossbreeding a problem or a solution for tropical world?

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Crossbreeding is one of the most controversial topics in livestock husbandry, although introgression of exotic breeds into indigenous populations has been pursued by most societies and nations in order to improve production rates.

As deleterious effects of massive use of crosses, instead of promoting local breeds, are the erosion of indigenous livestock genetic resources and discontinuation of old traditional husbandry practices, which have contributed to increase poverty in many rural areas and human migration to urban centers of the world. However, it has to be recognized that the use of crossbreeding approaches in some cases has generated new synthetic breeds useful to help in increasing production rates and consequently improving national economic performance indicators.

In the case of cattle, major international movement of animals started with European colonization of Africa, Asia and Americas, generating since then a continuous flow of live animals, semen and embryos.

In the case of South America, in special in Brazil where there are no original local livestock breeds, the genetic background of present cattle is reported to be formed by the first taurine Iberian cattle brought by Portuguese and Spanish colonizers between XVI and XVIII centuries. There is also some scientific information about the possible movement of cattle from Portuguese African colonies to Brazil following slavery trade (Miretti et al., 2002; Miretti et al., 2004). Later, during early XX century, there were several imports of animals from India to Brazil in order to improve production and adaptation of local population to tropical environments. The first records of official importation of animals from India to Brazil range from 1920 to 1930, being the most relevant imported breeds Gir and Ongole (re-named in Brazil as Nellore). These animals with indicus background are generally named "zebu" (which stands for indicine genome carrier animals). A second official importation wave of live animals from India to Brazil has occurred in the 1960 decade, although there are reports about "unofficial" importation sporadic events of indicine semen over the years. Nellore was bred and



selected for meat purpose and Gir mainly for milk production (Figure 1a and 1b illustrate present day individuals from these two breeds, respectively a bull and a cow).



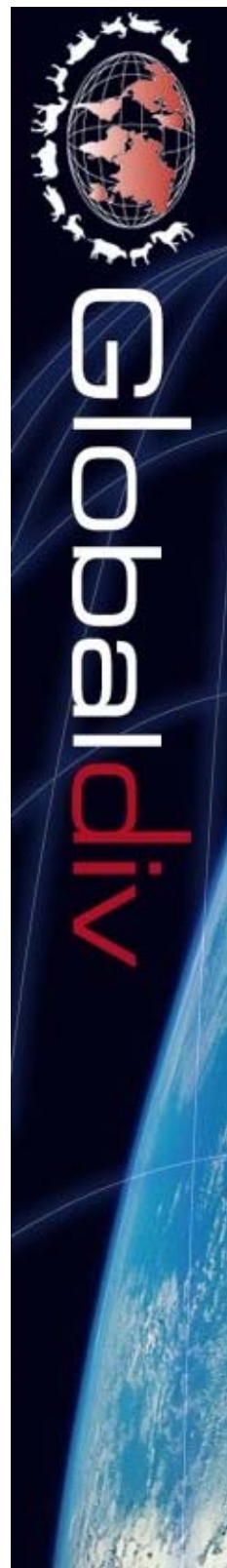
Figure 1a. Zebu breeds and crosses existing in Brasil. A Nellore bull



Figure 1b. Zebu breeds and crosses existing in Brasil. A Gir cow.

The combination of former "local" adapted Iberian cattle with the later introduced indicine genomes has created, over the years, a natural and very well adapted combination of good production rates and environment adaptation. The background of the actual population is composed by the mixture of taurus and indicus genomes which can be confirmed by the massive presence of taurine mitochondrial DNA haplotypes in the general population, which express clear indicine phenotypes (Meirelles *et al.*, 1999).

During the second half of XX century, following the modernization of global communication technologies and means of transportation, the trade and exchange of live animals, semen and embryos among different world regions has created an economically important new market. In this context, Brazil



received influence of several taurine breeds that were used to produce crosses with "local zebu" breeds aiming to improve production indexes. Limousin, Marchigiana, Piemontese, Simenthal, Charolais, Angus and Hereford were the most important ones in beef systems. For dairy purposes, Holstein, Jersey and Brown Swiss were the most prominent ones.

Except for dairy breeds, where environment conditions could be somehow changed artificially in order to maintain the high milk production levels observed for those breeds in temperate regions, the use of taurine pure beef breeds in tropical environments revealed to be unsatisfactory. To overcome the difficulty of using taurine pure breeds in tropical areas, they were used in crosses with local Nellore population showing to be an interesting way to increase production by exploring the benefits of heterosis in F1 generation. However the constraint of gene pools segregation in the F2 generation (producing individuals with extreme phenotypes) and the unrealistic farm management of crosses and backcrosses in low and medium input technology systems (comprehending the vast majority of production systems in tropical areas) have discouraged such type of husbandry practice. In parallel, several initiatives on setting breeding programs for indicine pure breeds have started and became very successful in Brazil, leading the "local zebu" populations to consistent improvement in the last two decades.

Brazil holds nowadays the second largest cattle herd in the world with around 200 million heads (India has the highest population), being the major meat exporter (in tons of meat) and reaching milk self sufficiency in 2000.



Figure 1c. Zebu breeds and crosses existing in Brasil. A Girolando cow.

Before reaching milk self sufficiency, Brazil relied only upon taurine dairy pure breeds (in special Holstein) or on their uncontrolled crosses with local general cattle. In early 1980 decade, a group of dairy breeders decided to produce a formal crossbred system to select for and benefit from the best traits of Holstein and Gir. This initiative was called Girolando project and designates the name of the new breed at the present (Figure 1c illustrates a Girolando cow). Oriented crosses with those two parental breeds (Holstein



and Gir) led to the fixation of so called "5/8" animals (3/8 Gir and 5/8 Holstein) that are considered the optimal combination and should be fixed as the best combination. More details on this synthetic breed and how it was created and maintained can be viewed in the Girolando Breeders Association website (www.girolando.com.br).

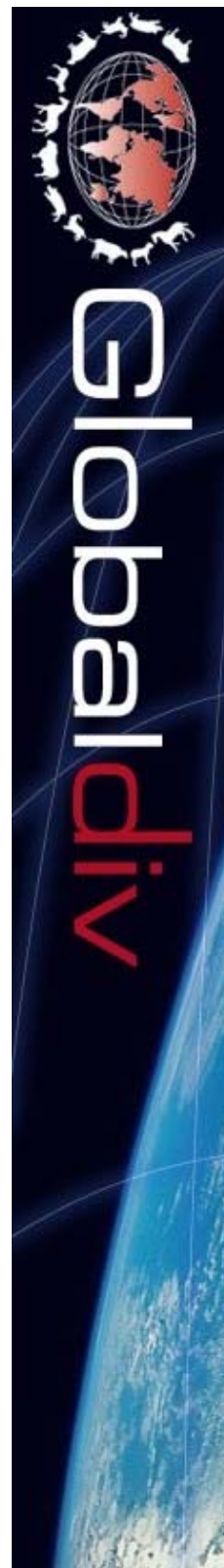
From the total milk production in Brazil (27 million tons), around 80% comes from indicus/taurus crossbred animals, being Girolando crosses the most relevant in this scenario. A typical "5/8" Girolando cow produces around 6.000 kg milk per lactation but can reach 15.000 kg in several cases where the influence of taurine gene pool is marked. On the other hand, the resistance to parasites and diseases, besides its resilience and capacity of survive in harsh environments in medium to low input systems, are probably reminiscences from indicine genetic background.

Several points for consideration can be raised from this specific piece of history and about its consequences to livestock production:

1. Animal movements around the globe in three different moments: i) Iberian cattle movement to South America, ii) zebu import to Brazil and iii) global spread of modern specialized breeds, has allowed Brazil to reach high performance on meat and milk production.
2. The use of an improved taurine dairy breed (Holstein) in combination with an indicine adapted one (Gir), generating the new combination Girolando, has allowed the sustainable production of 27 million tons of milk per year, guaranteeing self sufficiency to the country.
3. Girolando can be considered a "tropical" synthetic breed since it joins the best characteristics of the parental breeds after oriented crosses.
4. These benefits were only possible due to the pre-existence of two other breeds submitted to very precise breeding schemes (Holstein in Netherlands, Canada and US, and Gir in Brazil). Girolando is also being under selection in a national breeding program.
5. The maintenance of pure breed nucleus is mandatory to conserve biodiversity in the parental breeds.
6. Brazil (and South America in general) can be considered an important site for ex-situ livestock genetic resources conservation programs due to the favorable environmental conditions, which can be testified by this short history.

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The Breed of the month - The Indo-Brazilian zebu

Also known as Indubrasil or Induberaba (in Portuguese), the Indo-Brazilian is a zebu type breed and recognized as the first neo-zebu breed created in the world, formed in Brazil by crosses between Gir, Nellore and Guzerat from 1890 to 1920. In 1946 Indo-Brazilian cattle was imported by the United States, contributing to the development of Brahman breed.

The breed is white to dark grey in color and generally taller and lighter muscled than the Brahman and Nellore. One of the notable features of the breed is its extremely large, pendulous ears. It probably has the largest ears of any of the cattle breeds.



Currently, its habitat is restricted to northeastern Brazil and the region of Minas Gerais, with 205,297 registered animals over the years, being 11,661 in the last 5 years. Characteristics from adult animals are: weigh between 500-750 kg (females) or 850-1000 kg (males). Even today, many of crossbred animals sent to slaughter have united middle ear remembering the old days of predominance of this breed.





Compared with other predominant zebu breeds in Brazil (as Nellore, Gir and Guzerat), Indo-Brazilian has a very limited population size and few scientists and breeders dedicate efforts to promote this breed. The Brazilian Zebu Breeders Association (ABCZ) has been working hard to promote this breed by organizing and conducting a national breeding program.

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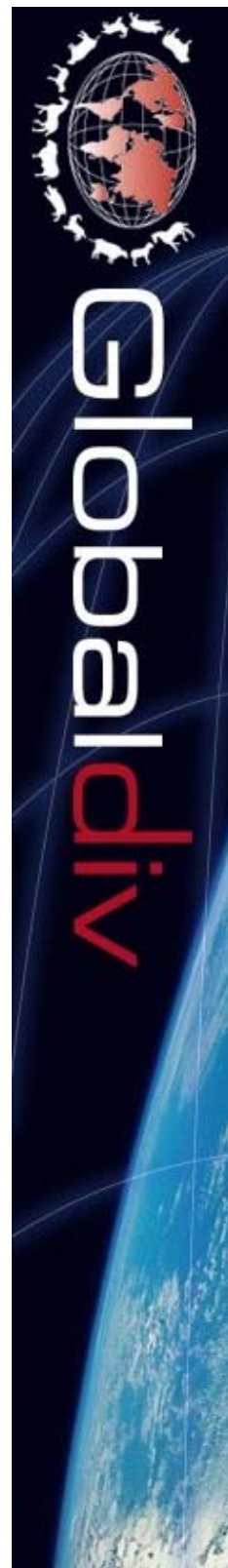
Events calendar

- 2nd GLOBALDIV Summer School - 7-10th September 09, Piacenza, Italy
www.gloabldiv.eu
- EFCF conference 2009: 17 September - 20 September 2009 in Hilvarenbeek, the Netherlands
www.kinderboerderijen.nl/paginas/skbn_dienstverlening.php?id=17
- IDF World Dairy Summit , Berlin 20-24 september 2009
www.wds2009.com
- 11th Annual BIOECON Conference on "Economic Instruments to Enhance the Conservation and Sustainable Use of Biodiversity" - Centro Culturale Don Orione Artigianelli - Venice, Italy - 21-22 September, 2009
www.bioecon.ucl.ac.uk/04_11_ann-conf.htm
- 28th Congress of the European Simmental Federation at Lake Balaton, the biggest lake of Central Europe - Siófok, Hungary - 22-27 September, 2009
www.agroeuropa.hu/simmental2009/
- 8th International Symposium of Animal Biology and Nutrition - September 24-25, 2009, Romania
www.ibna.ro/symposium-en.html
- Association for the Advancement of Animal Breeding and Genetics - 30th Anniversary Conference, Barossa Valley, 27th September - 2nd October 2009
<http://aaabg.org/aaabg18>
- 6th NIZO Dairy Conference - Dairy ingredients: innovations in functionality , 30 September - 2 October 2009, Papendal, The Netherlands
www.nizodairyconf.elsevier.com
- 15th meeting of the FAO-CIHEAM Mountain Pasteurs Network, 7-9th October 2009 - Switzerland
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- VII SIRGEALC - 28-30th October 2009, Chile
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- The cattle sector in Central and Eastern Europe - Developments and opportunities in a time of transition 2009 - K.J. Peters, A. Kuipers, M.G. Keane, A. Dimitriadou - 180 pages - paperback - ISBN-13: 978-90-8686-104-0
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