International Programme on Research and Training on Sustainable Management of Mountain Areas

"PROTECTING MOUNTAIN BIODIVERSITY"

Livestock biodiversity in Mediterranean mountains

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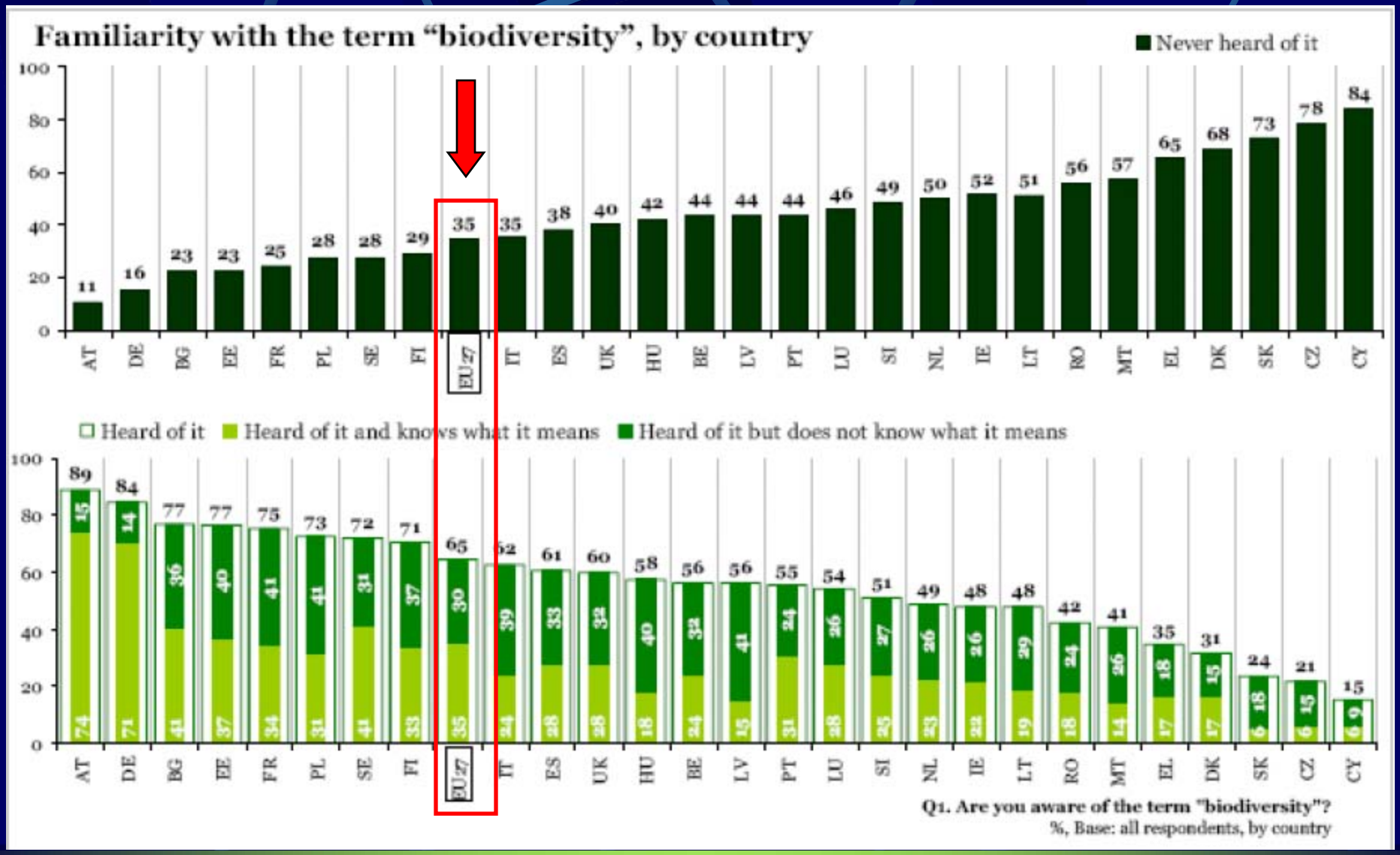
What is biodiversity?



Biological Diversity

Biodiversity

The contracted term *Biodiversity* was coined by W.G. Rosen in 1985 while planning the National Forum on Biological Diversity organized by the National Research Council.

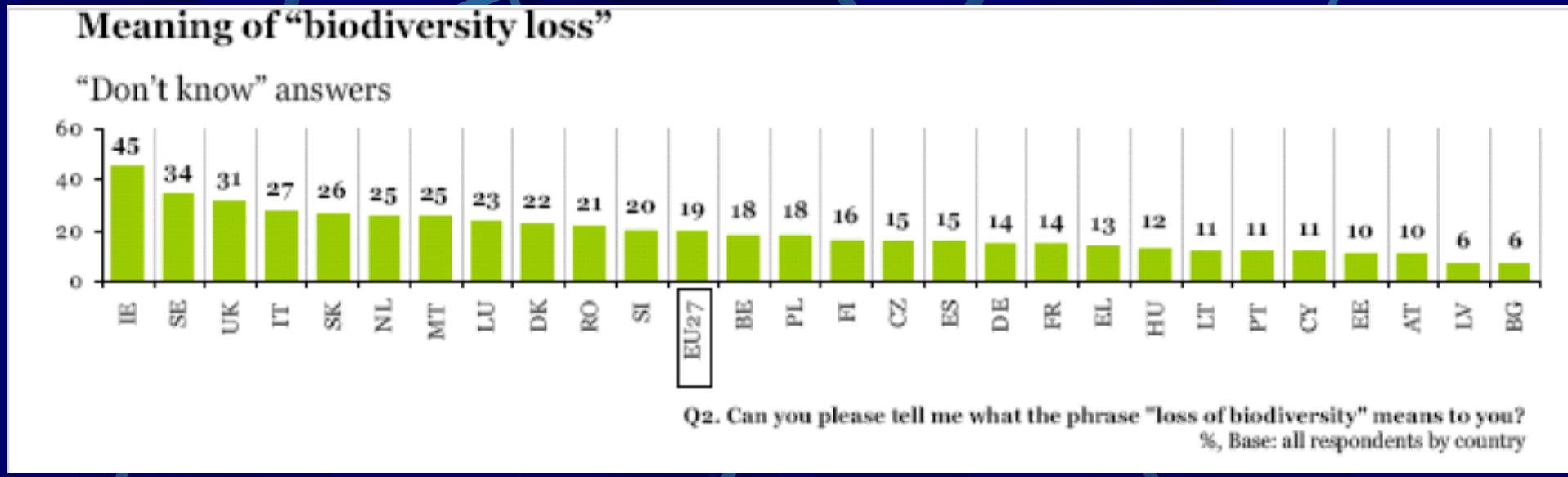
Definitions of biodiversity

The term can have many interpretations and it is most commonly used to replace the more clearly defined terms *species diversity* and *species richness*.

Variation of life at all levels of biological organisation.

The variability among living organisms from all sources, including *inter-alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part (Convention on Biological Diversity, 1992)

What does "loss of biodiversity" mean?



The main cause of biodiversity loss is habitat loss, induced by intensive agricultural and forestry practices and land use changes.

Biological diversity in agriculture

OVERALL BIOLOGICAL DIVERSITY

also molecular diversity?

BIOLOGICAL DIVERSITY IN AGRICULTURE

genetic diversity

species diversity

ecosystems diversity

Variability of Earth's ecosystems

Diversity of genes within animal, vegetal and microbial species

Number of animal, vegetal and microbial populations

Biodiversity and livestock husbandry

In the majority of the developed countries, livestock production is predominantly supported by cosmopolite breeds. These breeds are supported by genetic selection plans in order to improve their performance and are reared according to intensive methods.

The current loss of genetic variability within cosmopolite breeds could make livestock animals less flexible in their response to sudden environmental changes or emerging diseases.

Biodiversity and livestock husbandry

The use of few high-producing breeds at the expense of more rustic local ones has led to a sharp contraction of livestock activities in marginal mountain areas which are characterised by low economic potential. This has contributed to the social and environmental degradation of these areas.

Animal-derived food products are increasingly exposed to a flattening of their quality, with adverse consequences for consumers.

Safeguarding livestock biodiversity

Scientific reasons

animal morphology and physiology evolution of species, between-species interactions, unique genetic characters, etc.

Ethical/aesthaetic reasons

respect of the right of existence for all living beings; exaltation of the beauties of nature

Why ?

studies concerning the stages of settlement and taming within different territories

Hystorical reasons

individuation of autochthonous breeds, rediscovery of ancient husbandry and cheese-making traditions (they are part of our culture and memory)

Socio-cultural reasons

Safeguarding livestock biodiversity

Why ?

→ **Husbandry reasons**

1 Local breeds have peculiar characteristics that are often lost in genetically selected breeds

↓

high adaptability, rusticity, longevity, resistance to climatic and environmental adversities, diseases resistance, high fertility, low-cost production

2 Local breeds are suitable for extensive breeding systems and for the exploitation of marginal mountain areas (thus allowing to contrast aesthetical and funtional decay of the environment)

3 Local breeds allow the production of typical food products with high nutraceutical value and peculiar organoleptic features

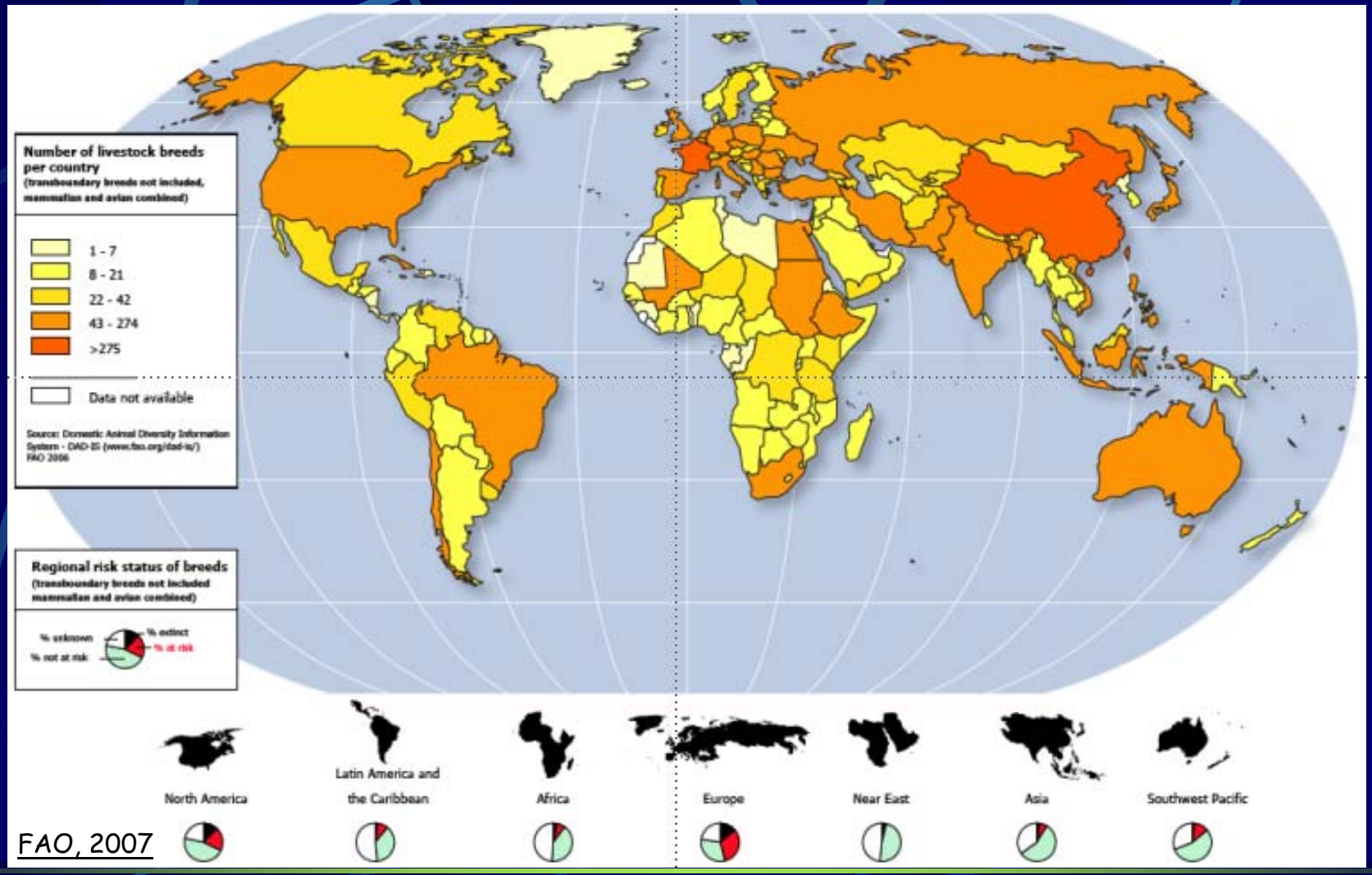
Livestock biodiversity: current state at world level

NUMBER OF SPECIES AND BREEDS

- 7.616 breeds belonging to 34 species (18 mammals e 16 winged)
- among these breeds: 6.536 autochthonous populations, 1.491 at risk of extinction, 690 already declared as extinct (510 in the European.Caucasian area). Today: 1350 breeds are menaced of extinction, on average 2 breeds are lost every week (FAO, 2007)

COWS	~ 1,3 thousand millions head
BUFFALOS	~ 165.000 millions head
SHEEP	~ 1 thousand millions head
GOATS	~ 800 millions head
EQUIDS	~ 164.000 millions head
AVIAN ssp.	~ 17 thousand millions head

Livestock biodiversity: current state at world level



FAO, 2007

European legislative measures to fight the loss of livestock biodiversity

AGRI-ENVIRONMENT REGULATION EEC 2078/92
Agricultural production methods compatible with the requirements of the protection of the environment and maintainance of the countryside

Incentives for the widespread of eco-friendly agronomic techniques and livestock activities:

- ✓ reduction of the use of fertilizers and pesticides
- ✓ development of organic farming
- ✓ conversion of arable lands to pastures
- ✓ extensification of livestock activities
- ✓ use of alpine pastures
- ✓ **breeding of endangered breeds**
- ✓ care of abandoned lands.

European legislative measures to fight the loss of livestock biodiversity

The EEC Regulation 2078/92 was subsequently replaced by Council Regulation (EC) No. 1257/99, which in turn is replaced by Council Regulation (EC) No. 1698/2005.

The Commission Regulation (EC) No. 817/2004 provides for financial support to be given for farmers rearing farm animals of "*local breeds indigenous to the area and in danger of being lost to farming*".

The breeds in question must contribute to the maintaince of the local environment.

European legislative measures to fight the loss of livestock biodiversity

Population thresholds below which a breed is considered to be endangered for the purposes of incentive payments (number of breeding females available for pure-bred reproduction)*:

Species	Number of breeding females
Cattle	7500
Sheep/Goats	10000
Equids	5000
Pigs	15000
Avian species	25000

* included in a Register (e.g. Herd Book) recognised by a Member State.

Loss of livestock biodiversity: current state in Italy

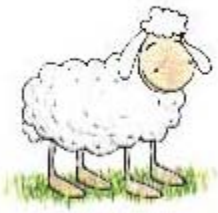
Italy is one of the richest countries in Europe and in the Mediterranean basin in terms of livestock biodiversity. This is probably due as a result of the presence of very different environmental conditions.

Since the early 50's loss of triple and double-purpose aptitudes: progressive decline in the number of raised breeds.

In North-Western Italy…

High number of breeds, mainly to be related to the importance of mountain and hilly areas. In these areas it is easier for niche livestock activities to survive due both to environmental and socio-economic difficult conditions in which farmers and livestock have to live.

Local breeds in NW Italy

	 cows	 sheep	 goats	 avian ssp	 rabbits
	Piemontese Oropa Red Pied Tortonese Barà Pustertaler	Biellese Delle Langhe Frabosana Sambucana Tacola Savoiarda Garessina Saltasassi	Alpina Roccaverano Vallesana Sempione	Blond Piedmont Blond Saluzzo	Grey Carmagnola
	Aosta Red Pied Aosta Black Pied Aosta Chestnut	Rosset	Aosta		
	Cabannina	Brigasca Marrana			

Autochthonous cow breeds in Piedmont

Piemontese

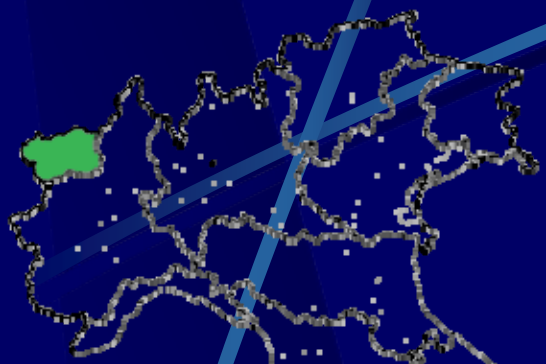
Oropa Red Pied

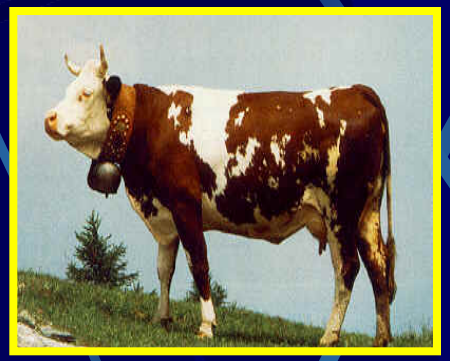
Varzese-Tortonese-Ottonese

Barà Pustertaler

BREED	DEMOGRAPHY
Piemontese	350.000 (250.000 GB)
Oropa Red Pied	4.000 AR
Barà Pustertaler	2.900 AR
Varzese-Tortonese - Ottonese	50

Autochthonous cow breeds in Aosta Valley





Aosta Red Pied

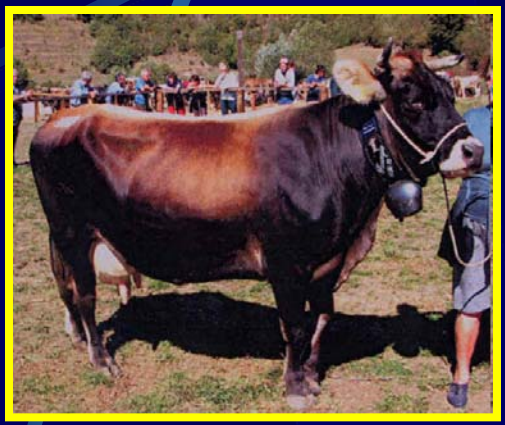
Aosta Black Pied

BREED	DEMOGRAPHY
Aosta Red Pied	70.000 (15.000 GB)
Aosta Black Pied	1.700 GB
Aosta Chestnut	10.650 (6.500 GB)

Aosta Chestnut

Autochthonous cow breeds in Ligury

Cabannina



BREED	DEMOGRAPHY
Cabannina	300 (AR)

Autochthonous sheep breeds in Piedmont

Delle Langhe

Tacola

Biellese

Sambucana

Frabosana

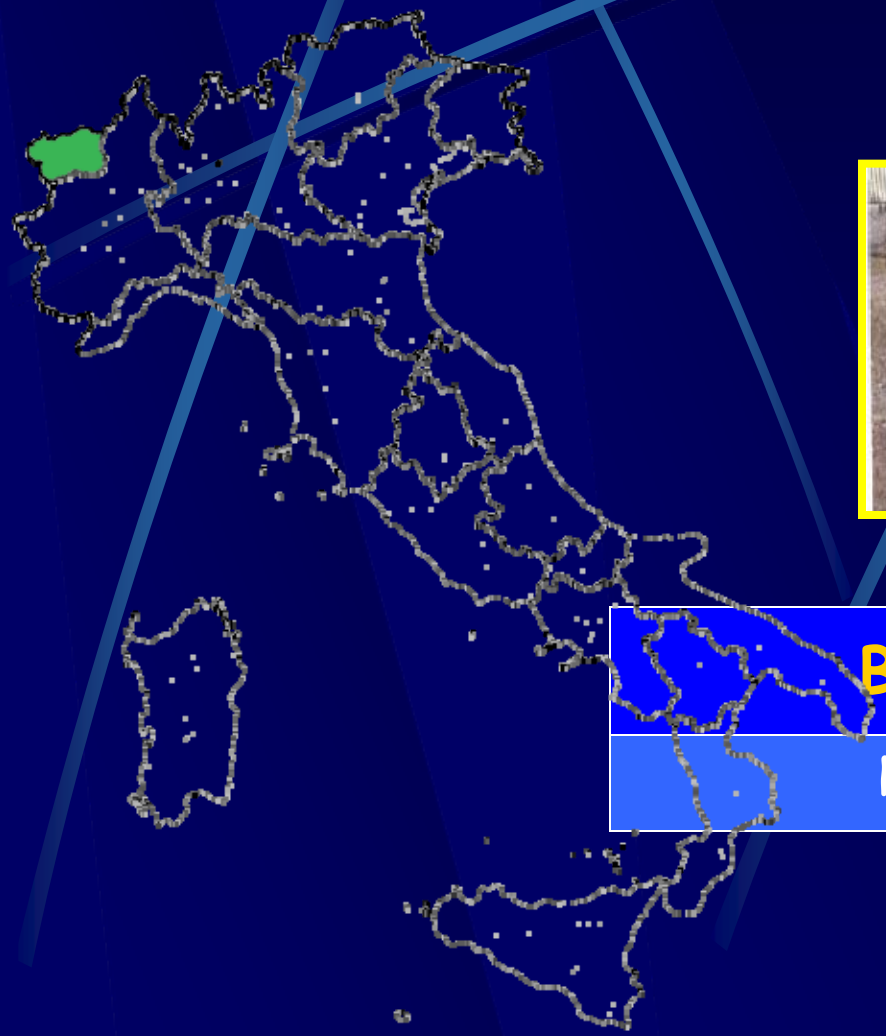
Savoiarda

Garessina

Saltasassi

BREED	DEMOGRAPHY
Biellese	3.246 GB
Frabosana (Roaschina)	6.232 AR
Garessina	107 AR
Sambucana (Demontina)	4.157 AR
Tacola	> 4.000
Saltasassi	< 20
Savoiarda	> 200
Delle Langhe	3.528 GB

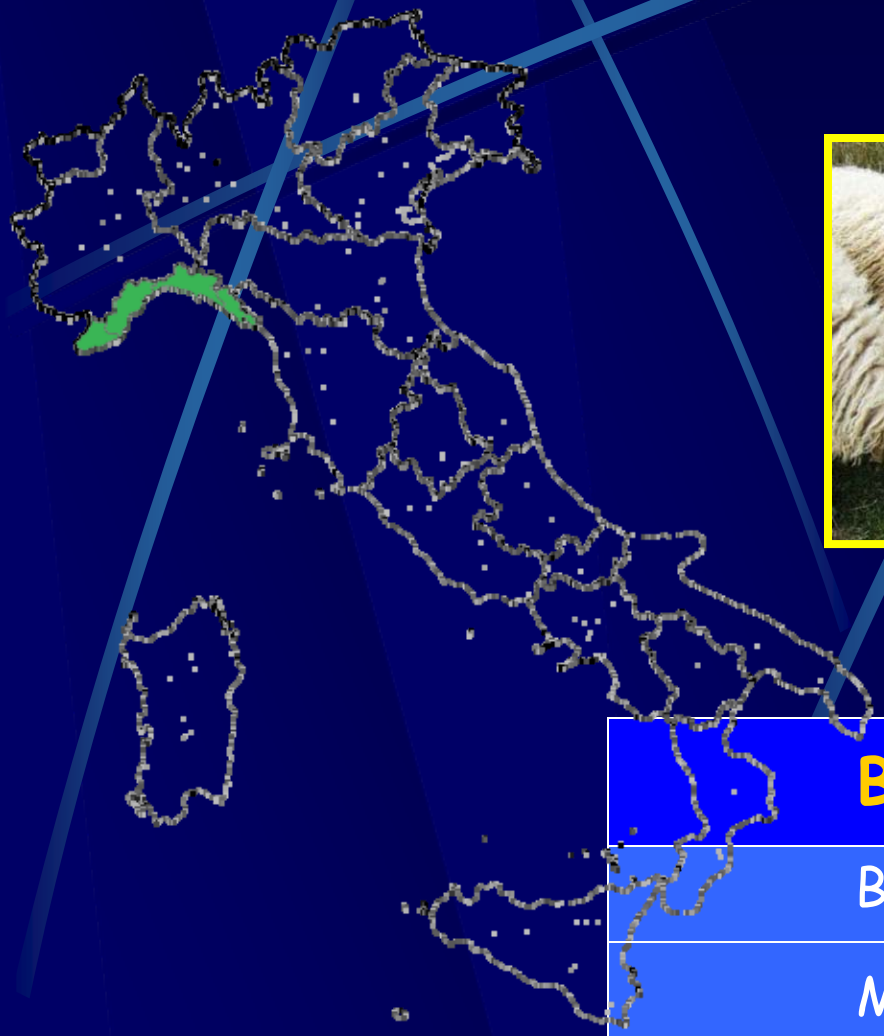
Autochthonous sheep breed in Aosta Valley



Rosset

BREED	DEMOGRAPHY
Rosset	1.900 AR

Autochthonous sheep breeds in Ligury



Brigasca

Marrana

BREED	DEMOGRAPHY
Brigasca	2.849 AR
Marrana	23 AR

Autochthonous goat breeds in Piedmont

Roccaverano

Sempione

Vallesana

Alpina

*waiting for official recognition

Grey of Lanzo Valleys

BREED	DEMOGRAPHY
Alpina	55.000
Roccaverano	2.584 AR
Sempione	100
Vallesana	155 AR
Grey of Lanzo Valleys*	140

Autochthonous goat breeds in Aosta Valley

Valdostana

BREED	DEMOGRAPHY
Valdostana	3.000 (1.854 AR)

Autochthonous breeds and typical food products

Aosta

PDO Fontina

Tortonese

Montébore

Oropa Red Pied

Maccagno

Cabannina

Cabannino

Delle Langhe

PDO Murazzano

Sambucana

Sambucano Lamb

Frabosana

Seirass del Fen

Brigasca

Brus

Roccaverano

PDO Robiola di Roccaverano

Valdostana

Moccetta

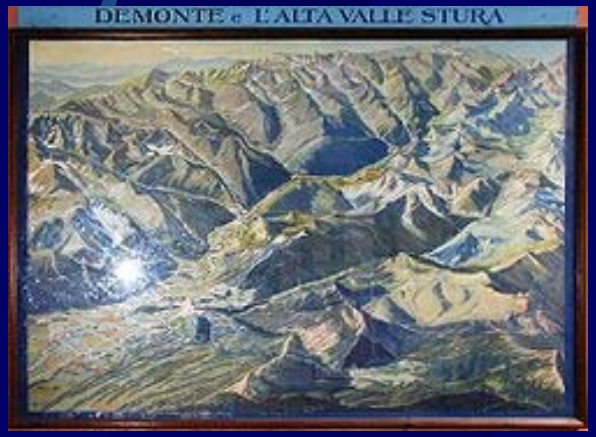
Case studies

Sambucana sheep: a project to save a valley

Its name origins from Sambuco, a small village located in Stura di Demonte Valley

Rearing this sheep hundreds of years in poor, rocky and marginal pastures with harsh climatic conditions contributed to make it well adapted to the unfavorable territory.

Nowadays shepherds appreciate Sambucana especially for its rusticity, agility and hardiness.



Sambucana sheep: a project to save a valley

After the second half of 20th century introduction of more improved breeds (e.g., Biellese sheep) in order to increase birth weight of the lambs → higher income for farmers.

This cross-breeding practice resulted in:

i) increasing weight of lambs due to larger and heavier bone structure rather than to major growth rate and meat yield

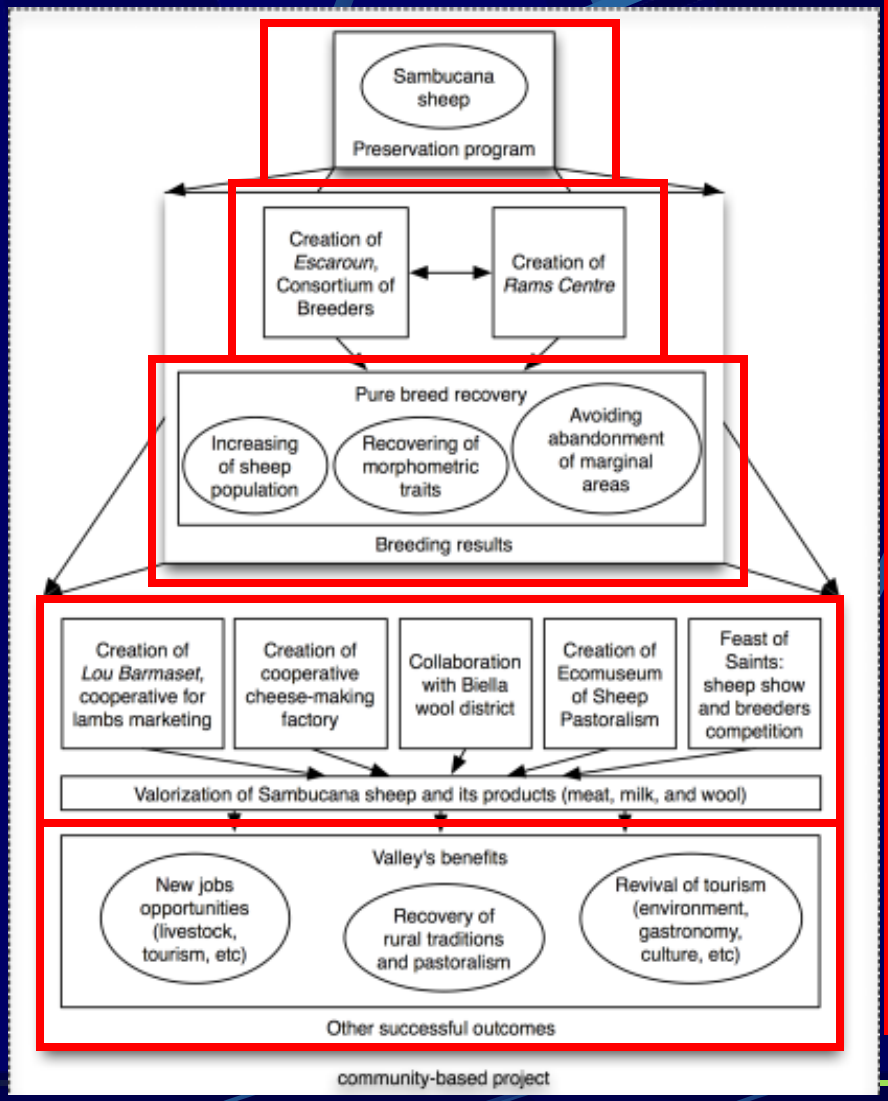
ii) worsening in sheep meat and wool quality

ii) decreasing in cross-breds adaptability to native marginal areas

iv) dramatic decreasing in the number of Sambucana purebreds.

Thanks to the willingness of some local inhabitants, a recovery program of the pure Sambucana breed began and took shape.

Sambucana sheep:
successful outcomes of the preservation program



- 1985: a local authority started to safeguard the breed
- 1988: the Consortium *Escaroun* was founded
  - genetic selection program
  - creation of a centre for the performance test of rams
- 1992: the Cooperative *Lou Barmaset* was founded
  - marketing of lambs (Guaranteed Sambucano Lamb brand and Slow Food Presidium)
- 2000: creation of the Ecomuseum of Sheep Farming
  - cultural and educational activities

Grey of Lanzo Valleys (Fiurinà):
a new goat breed in Piedmont

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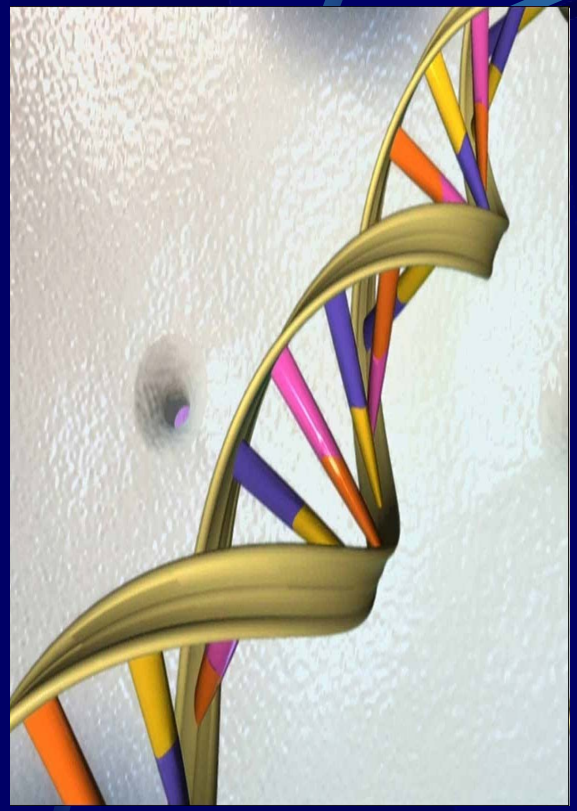
a new goat breed in Piedmont

17 communes, 69 farms, 1238 goats, 132 females and 8 males *Fiurinà*

Grey of Lanzo Valleys (Fiurinà):
a new goat breed in Piedmont



GENETIC ANALYSES

Sampling of biological material (hair follicles) for the comparison with other breeds (Vallesana and Sempione) reared in the same territory

Obtained genetic distances among breeds are quite small

Grey Goat of Lanzo Valleys has higher genetic distance from Sempione and Vallesana relative to the genetic distance existing between the latter breeds: **GREY GOAT OF LANZO VALLEYS HAS TO BE CONSIDERED A NEW BREED**

Moreover, Grey Goat of Lanzo Valley is highly distinguishable from all other Italian goat breeds. This is an important reason for its conservation and preservation.

Grey of Lanzo Valleys (Fiurinà): a new goat breed in Piedmont

EXTERNAL TRAITS

- **Size**: medium; weight: adulte females 45-55 kg, males 60-70 kg
- **Head**: light-headed, narrow and pointy ears; when present, well-developed and backward-pointing horns (when present)
- **Coat**: brown or reddish-brown; ash-gray, grey-white, black, beige or black purple (mixed in different shades) strigas on the back

Grey of Lanzo Valleys (Fiurinà):
a new goat breed in Piedmont

MORPHOMETRIC TRAITS

		Adult females	Males <2 years
Height at withers	(cm)	73	77
Height at rump	(cm)	75	76
Chest height	(cm)	34	33
Rump width	(cm)	17	16
Trunk length	(cm)	77	76
Chest girth	(cm)	87	87
Weight	(kg)	50	51

Grey of Lanzo Valleys (Fiurinà):
a new goat breed in Piedmont

PRODUCTIVE TRAITS

- **Lactation**: about 180 days
- **Milk yield**: 1,5 kg/head/day
- **Milk is used for**:

  - kid feeding
  - cheese-making (traditional dairy products)

- **Meat production**: kids are slaughtered at 10-12 kg live weight

Grey of Lanzo Valleys (Fiurinà):
a new goat breed in Piedmont

BREEDING SYSTEM