UNIVERSITÀ DEGLI STUDI DI MILANO
DIPARTIMENTO DI MEDICINA VETERINARIA E SCIENZE ANIMALI

TUTELA BIODIVERSITÀ AVICOLA ITALIANA

Phenotypic characterization and mating plan for biodiversity conservation in Modenese chicken breeders

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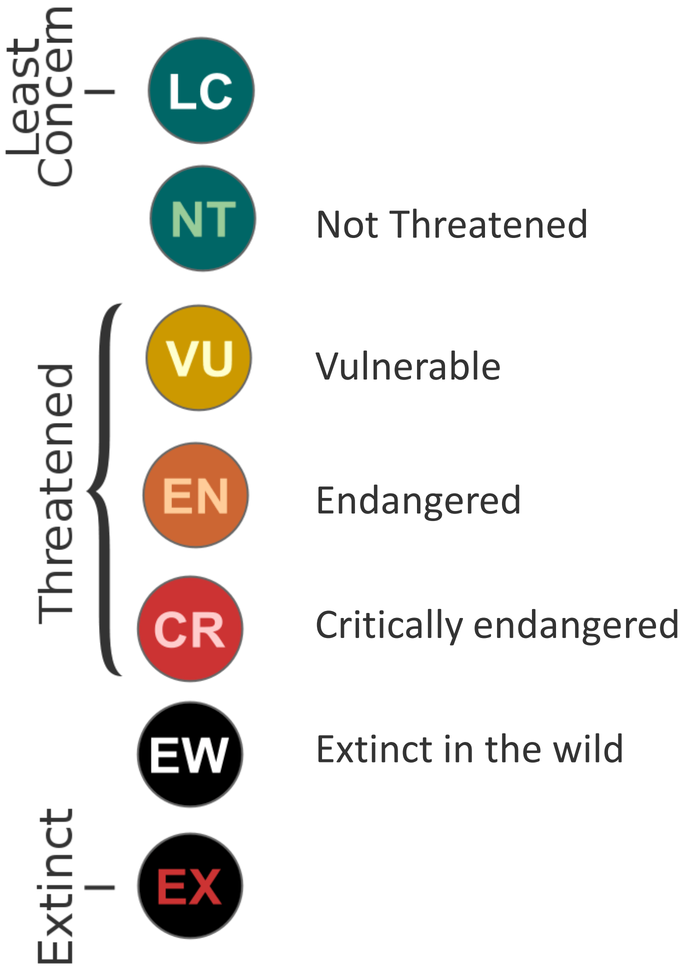
Turin, June 18th, 2025

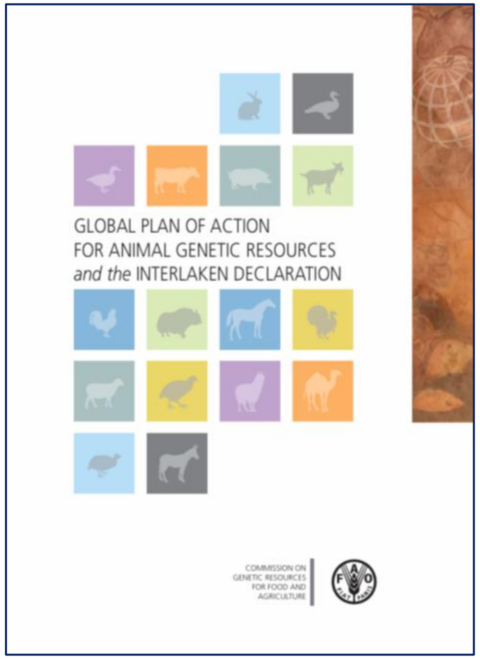
- Loss of biodiversity

- Main consequences:
    - Genetic erosion
    - Reduces ecosystem resilience
    - Increased risk of extinction
    - Cultural impoverishment

- International Union for Conservation of Nature’s (IUCN) - **Red List of Threatened Species**



- **Global Plan of Action for Animal Genetic Resources** (FAO)
- **Objectives:**
  - Characterize and monitor animal genetic resources to understand their diversity and status.
  - Promote the sustainable use of animal genetic resources to support food security and livelihoods.
  - Conserve animal genetic resources both *in situ* and *ex situ*
  - …



- **Strategic priority Area 1: Characterization, Inventory and Monitoring of Trends and Associated Risks**

Phenotypic characterization of animal genetic resources: systematically documenting the observed characteristics, geographical distribution, production environments and uses of these resources.

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Europe

Risk Status of Local Breeds by Regions and Species

Risk Status by Region | Risk Status by Species

Unknown: 40,38%

Not at risk: 10,51%

Vulnerable: 4,66%

Endangered maintained: 2,39%

Endangered: 24,01%

Critical maintained: 0,48%

Critical: 8,48%

Cryo conserved only: 0,24%

Extinct: 8,84%

40,26%

Risk Status of Local Breeds by Species

DADIS Regions: Europe and the Caucas...

Country Name: (Tutti)

Avian/Mammalian: Avian

Species: Chicken

Risk Status
- Unknown
- Not at risk
- Vulnerable
- Endangered maintai...
- Endangered
- Critical maintained
- Critical
- Cryo conserved only
- Extinct

Species	Chicken	Totale complessivo
Unknown	338,0	338,0
Not At Risk	88,0	88,0
Vulnerable	39,0	39,0
Endangered-Maintained	20,0	20,0
Endangered	201,0	201,0
Critical-Maintained	4,0	4,0
Critical	71,0	71,0
Cryo Conserved Only	2,0	2,0
Extinct	74,0	74,0

Last update: 14/06/2025 13:34:51

Domestic Animal Diversity Information System (DAD-IS)

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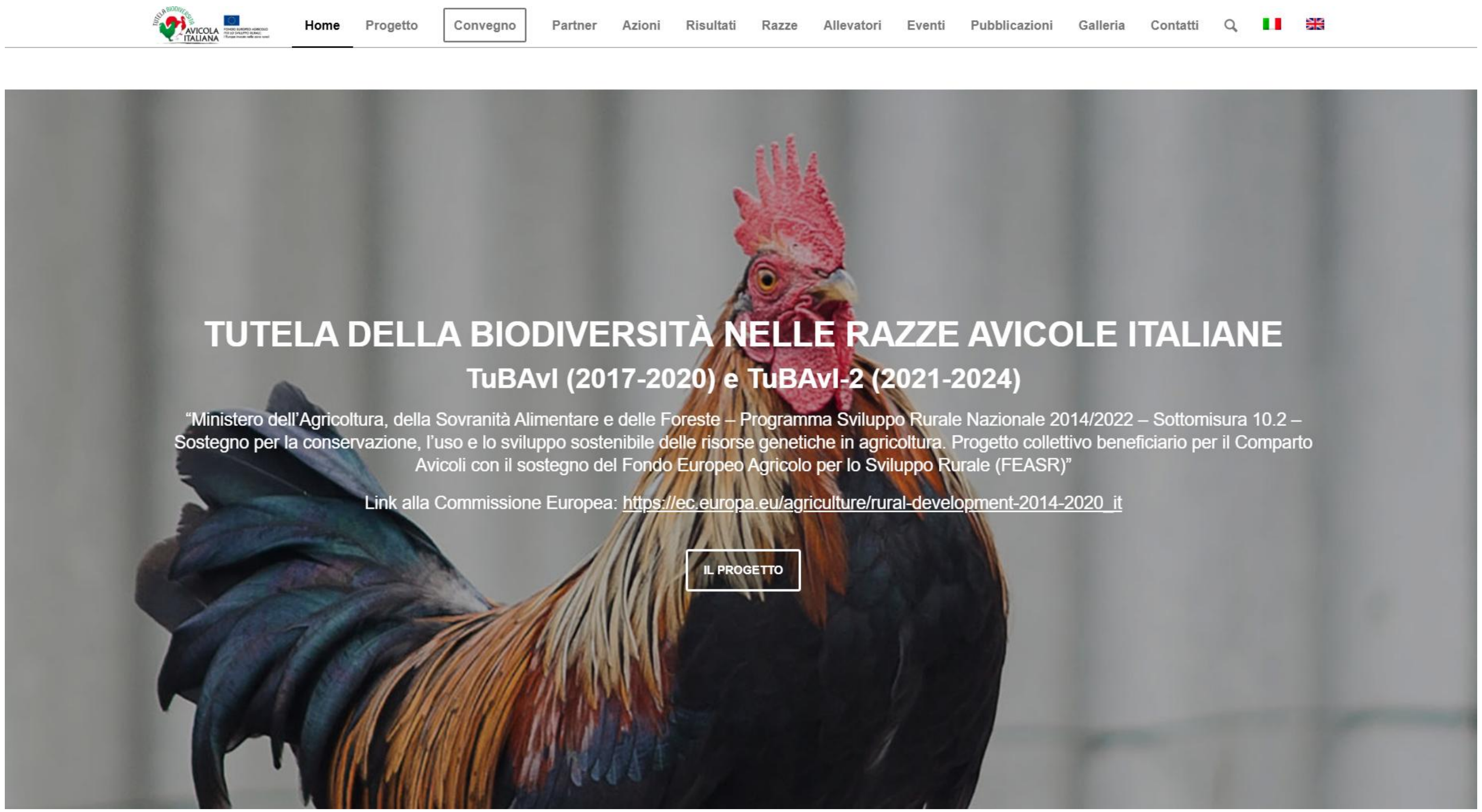
FAO FIAT PANIS

AIM: describe the Modenese chicken breed from a genetic and phenotypic point of view



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MODENESE (Fulva di Modena)

- Diffusion: Emilia-Romagna (area of origin) and Lombardia (Mantova province)
- Dual purpose (+++ egg)
- Medium-large animals
- Golden or blue golden wheat plumage
- White shell eggs
- During the past century, the breed was crossed with the ancestral Italian Leghorn (black red), to improve egg production

- Risk level: **at risk**
- Detailed local risk status: **Critical maintained**

Mazzon (1932); Clementi (1950); Zanon et al. (2006); Sabbioni et al., (2006); Ceccobelli et al., (2013); Zanon and Bigi (2022)

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Year 0 (2023-2024)

9 rooster + 14 hens
(180 days)

26 microsatellite markers
(AVIANDIV-FAO)

Incubation
(Beginning of Year 1)

Introduction of adult animals – November 2023

Genetic characterization – January 2024

Morphological characterization
(FAO guidelines) – February 2024

Family formation – March 2024

Incubation (Beginning of Year 1) – May 2024

Exit of adult animals – July 2024

January 2024 – March 2024: group oviposition

March 2024 – July 2024: family oviposition

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Genetic characterization

- Total of 76 alleles identified
- Polymorphism rate of 92,3% (3 loci not polymorphic)

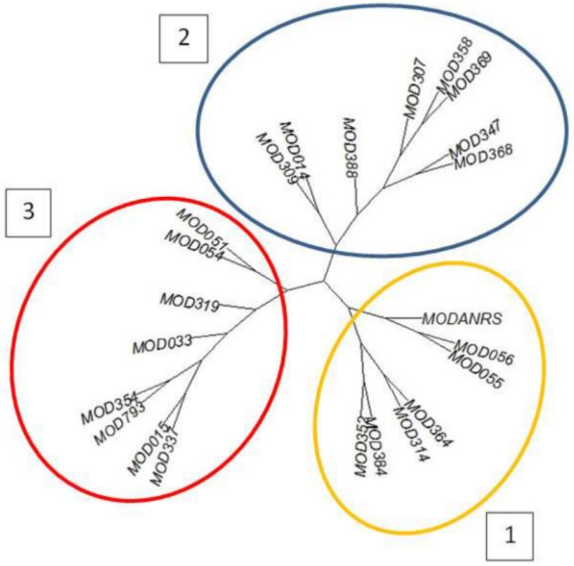
Variability indexes

	Na	Ne	Ho	He	F
Mean	2,731	1,975	0,411	0,431	0,034
SE	0,138	0,091	0,032	0,029	0,036

Na = total number of alleles
Ne = effective number of alleles
Ho = observed heterozygosity
He = expected heterozygosity
F = fixation index

Genetic characterization & mating plan

Genetic distances – for female subjects



Conservation index – for male subjects

- Obtained combining:
  - Individual genetic variability index (H-ind)
  - Kinship coefficient (P)

Family formation

Objective:

- reducing inbreeding levels
- maximizing the flock's genetic variability

	Rooster	Hens
F1	1	4
F2	1	3
F3	1	6

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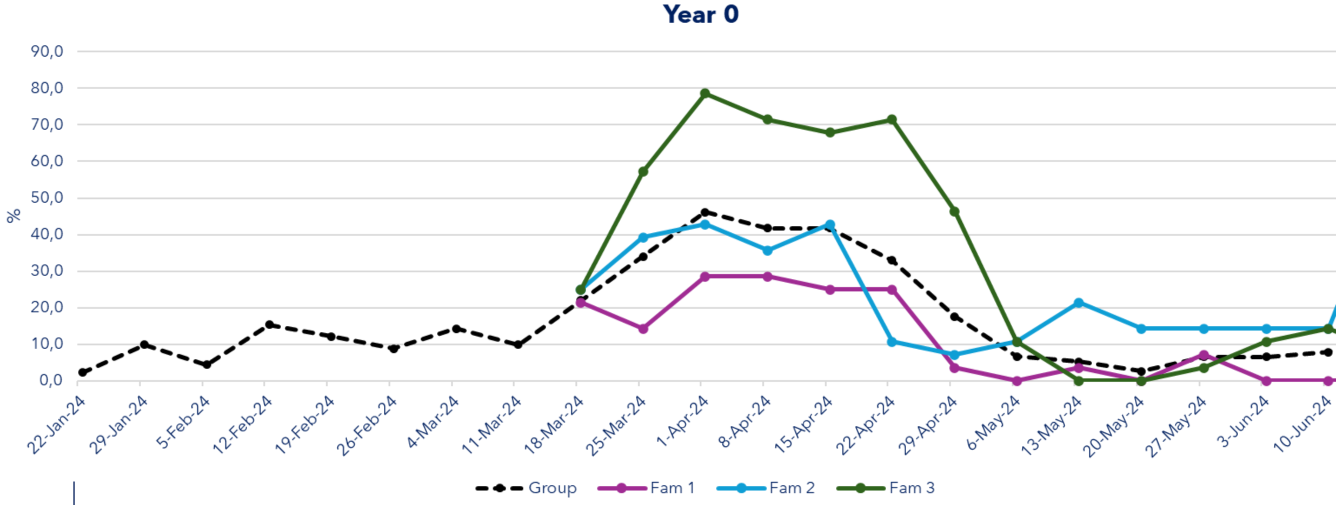
Oviposition curve



28 weeks of age

Egg weight (g)

	Fam 1	Fam 2	Fam 3	Group
Mean	54,6	55,7	53,3	54,2
SD	3,9	4,6	4,3	4,4
Min	45,0	40,0	41,0	40,0
Max	63,0	65,0	63,0	65,0

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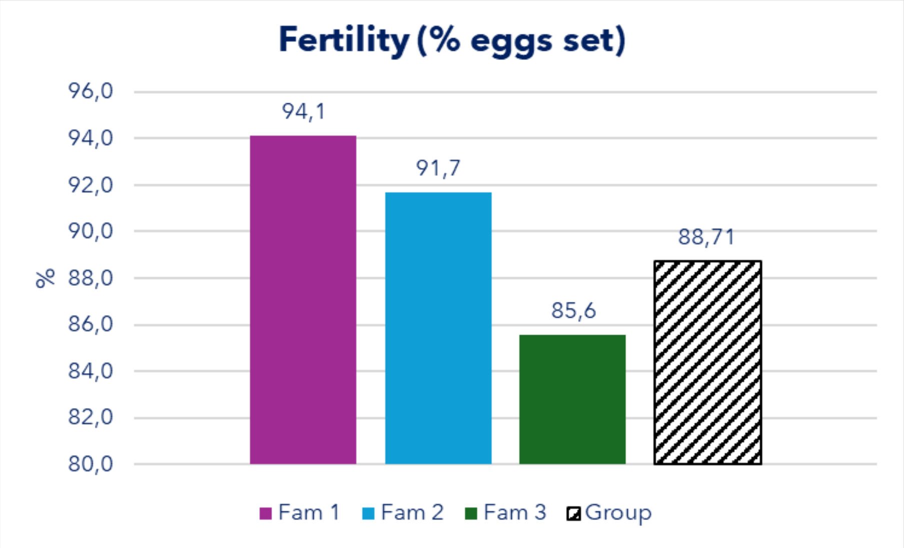
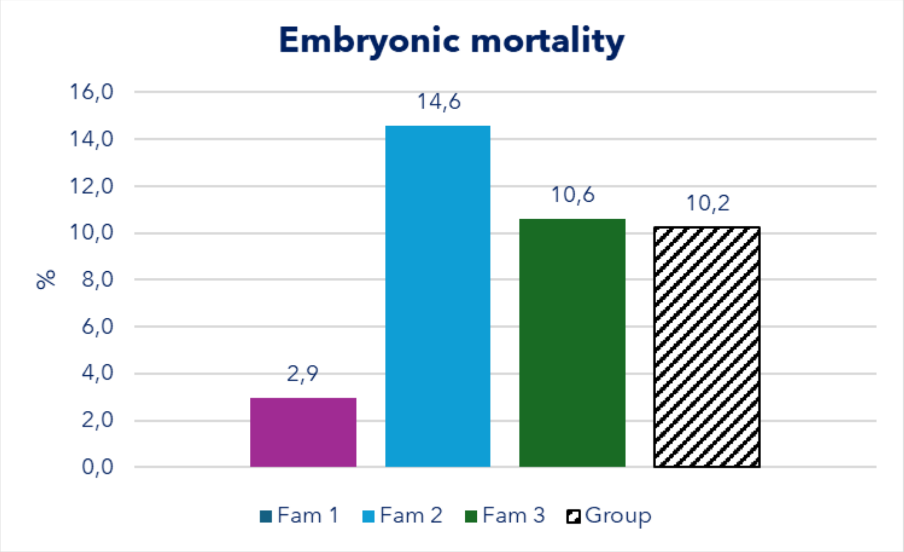
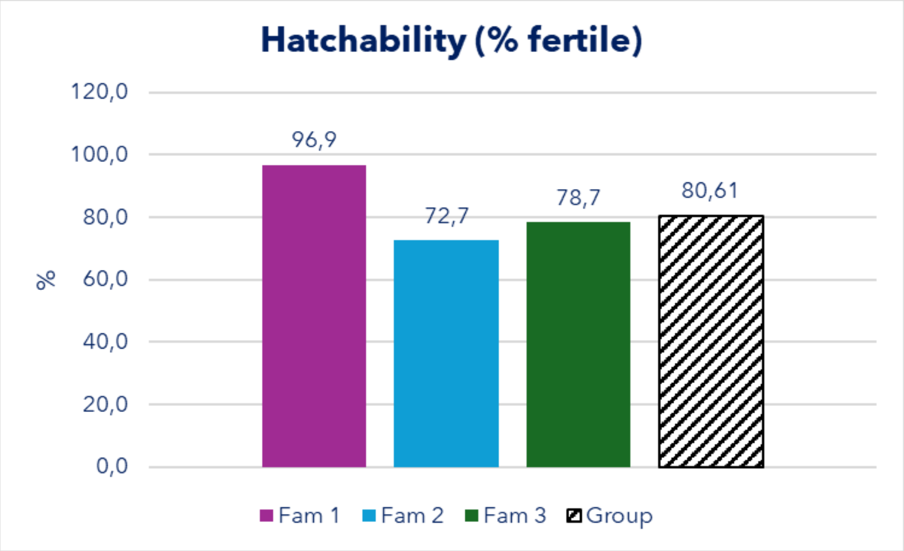
Incubation data







Morphological characteristics - Male

	Mean	SD	Min	Max
Comb	6	1	5	7
Live weight	2330	193,5	2080	2660
Body length	45,4	2,0	43,0	48,0
Tarsus length	9,8	0,4	9,0	10,0
Tarsus diameter	1,1	0,2	1,0	1,4
Tarsus circumference	4,7	0,3	4,5	5,0
Sternum circumference	35,6	2,9	32,0	39,5
Spur length	2,9	1,2	1,5	4,5
Wingspan	48,6	1,3	47,0	51,0

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Morphological characteristics - female

	Mean	SD	Min	Max
Comb	6	1	5	7
Live weight	2253,5	283,0	1840	2655
Body length	40,0	2,0	36	44
Tarsus length	8,3	0,6	7	9
Tarsus diameter	0,8	0,1	0,7	1
Tarsus circumference	4,1	0,2	4	4,5
Sternum circumference	35,5	2,8	31	41
Spur length	-	-	-	-
Wingspan	42,1	2,2	37	45

Achievements:

- Establishment of a nucleus population managed according to herdbook standards
- A strategic step for preserving breed biodiversity and controlling inbreeding

Next steps:

- Continuous monitoring of phenotypic characterization
    - Oviposition curve
    - Growth curve
    - Fertility

- Evaluation of product quality and strategies for valorization
    - Meat quality assessment
    - Egg quality assessment

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Thanks for the attention!

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FONDO EUROPEO AGRICOLO PER LO SVILUPPO RURALE:
l'Europa investe nelle zone rurali

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