LIFE PERDIX

REDISCOVER BEAUTY IN RARITY

Realizzato con il contributo dello strumento finanziario LIFE dell'Unione Europea

BREEDING OF THE ITALIAN GRAY PARTRIDGE

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CARABINIERI

Federazione Italiana della Caccia

Fédération Nationale des Chasseurs

LEGAMBIENTE

Parco Delta del Po Emilia-Romagna

Cofinanziatore

BREEDING OF THE ITALIAN GRAY PARTRIDGE

The LIFE PERDIX Project aims at the recovery and conservation of the Italian partridge (Perdix perdix italica) through genetic selection, captive breeding and the reintroduction of viable populations within the Natura 2000 site "Valli del Mezzano", Special Protection Area (SPA IT4060008) in the Po Delta.

The Carabinieri Corps participates in the project with the

Bieri Wildlife Center

which belongs to the Department for Biodiversity of Lucca.

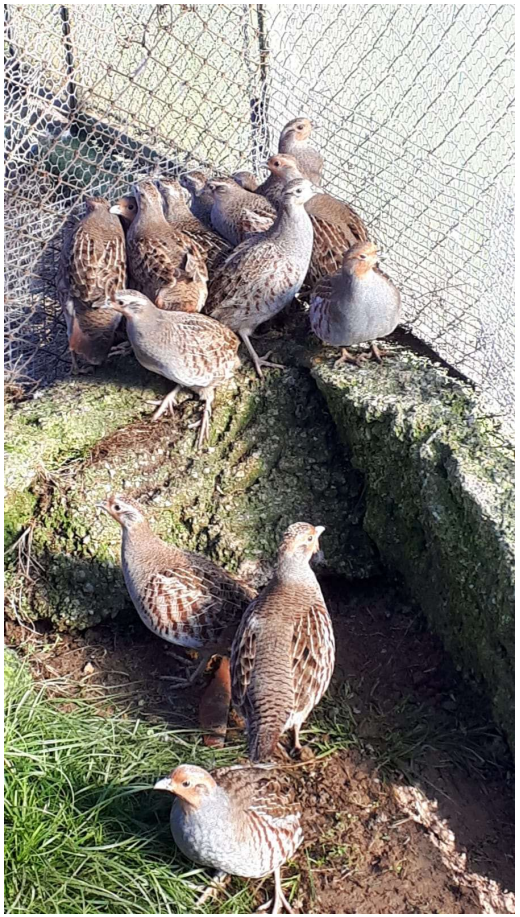
The center's primary objectives are:

BREEDING SUBJECTS OF PARTICULARE GENETIC VALUE

PROMOTING BREEDING TECHNIQUES TO PRODUCE ANIMALS CAPABLE OF REPRODUCING IN THE NATURAL ENVIRONMENT AND TEACHING THEIR OFFSPRING TO SURVIVE

BREEDING OF THE ITALIAN GRAY PARTRIDGE

In the summer of 2019, 1.848 genetically selected individuals were transfered to the Bieri Wildlife Centre and placed in the care of its skilled workers.



PHENOTYPIC SELECTION OF REPRODUCERS

Between January and February 2020, **274** pairs were phenotypically selected and matched to reduce the probability of inbreding then introduced into the breeding cages.

FEMALES HAPLOTYPE		MALES HAPLOTYPE		OFFSPRING HAPLOTYPE
P2-P10	+	MW	=	P2-P10
MW	+	MW	=	MW
MW	+	P2-P10	=	MW with useful nDNA

THE COMBINATIONS WERE MADE UNDER THE GUIDANCE OF THE BIO-CGE CONSERVATION GENETICS AREA OF ISPRA

*FOLLOWING THE RESULTS OF GENETIC ANALYSES THAT AIM AT THE MAXIMUM PRESERVATION OF P2-P10 HAPLOTYPES AND THE MINIMIZATION OF INBREEDING BETWEEN INDIVIDUALS.

Reproductive cycle in the Bieri Wildlife Center

Natural hatching

Caged breeders

Incubator and hatching machine

Choice of breeders

Heated chick rooms

Hatching with hens

Aviaries

Repopulation

Anti-predator training

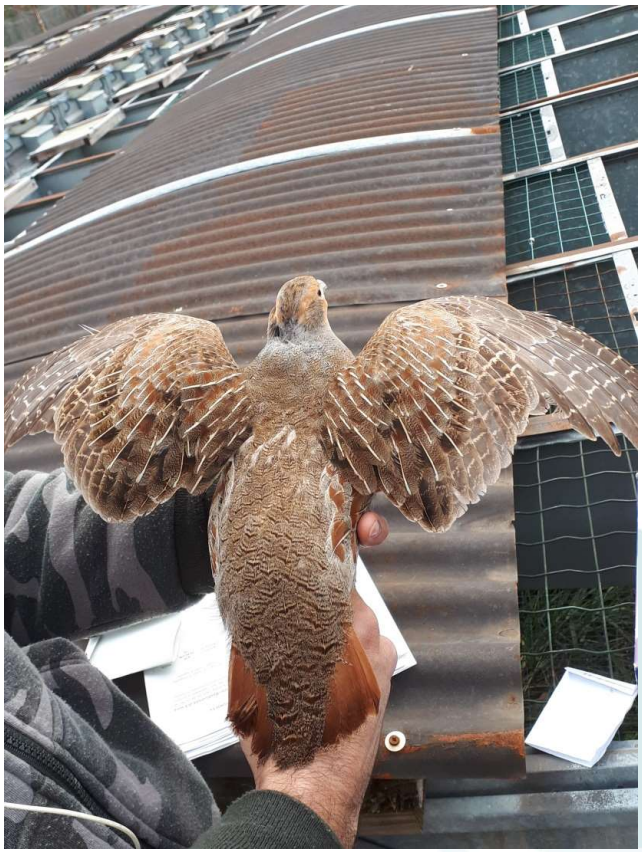
PHENOTYPIC SELECTION OF REPRODUCERS

In the following years, 700 pairs of breeding animals were selected and placed in the cages in November.

PAIRING OF THE REPRODUCERS season 2021		
	Females	Males
P2 – P10	600	100
MW	100	600
	700	700
TOTALE	1400	

PAIRING OF THE REPRODUCERS seasons 2022-2023-2024		
	Females	Males
P2 – P10	532	168
MW	168	532
	700	700
TOTALE	1400	

The number of breeding pairs with MW females compared to the 2021 season was increased in order to obtain more MW males among the progeny, so as to increase genetic variability and facilitate the phenotypic choice of males to be used as breeding stock



*FEATHER SAMPLING FROM BREEDING STOCK CHOSEN FOR GENETIC ANALYSIS

SPAWNING

Spawning begins in March.

YEAR	START OF LAYING	NO. OF EGGS COLLECTED
2020	23 MARZO	13.100
2021	19 MARZO	28.818
2022	9 MARZO	24.415
2023	13 MARZO	25.169
2024	16 MARZO	22.604

Eggs are marked for tracking

Egg collection takes place 2 times a day until mid-June.

Once the number of eggs useful for the required adult production has been reached, the collection is interrupted, although the pairs continue to lay.

The descendant lines of pairs with female P2-P10 are separated from those with MW females to maintain the genetic distinction of chicks in chick-houses

INCUBATION AND HATCHING

Every week, between April and June, the chosen eggs are introduced into the incubator where they remain for 21 days and then transferred to the hatching chamber where after 4 days the chicks are born.

During the incubator phase, **candling operations** take place to eliminate clear, non-fertile eggs or eggs with dead embryos.

YEAR	NO. OF EGGS COLLECTED	NO. EGGS INCUBATED	NO. BORN
2020	13.100	9.794	5.804
2021	28.818	16.118	11.461
2022	24.415	23.051	15.770
2023	25.169	22.588	15.059
2024	22.604	17.048	12.094

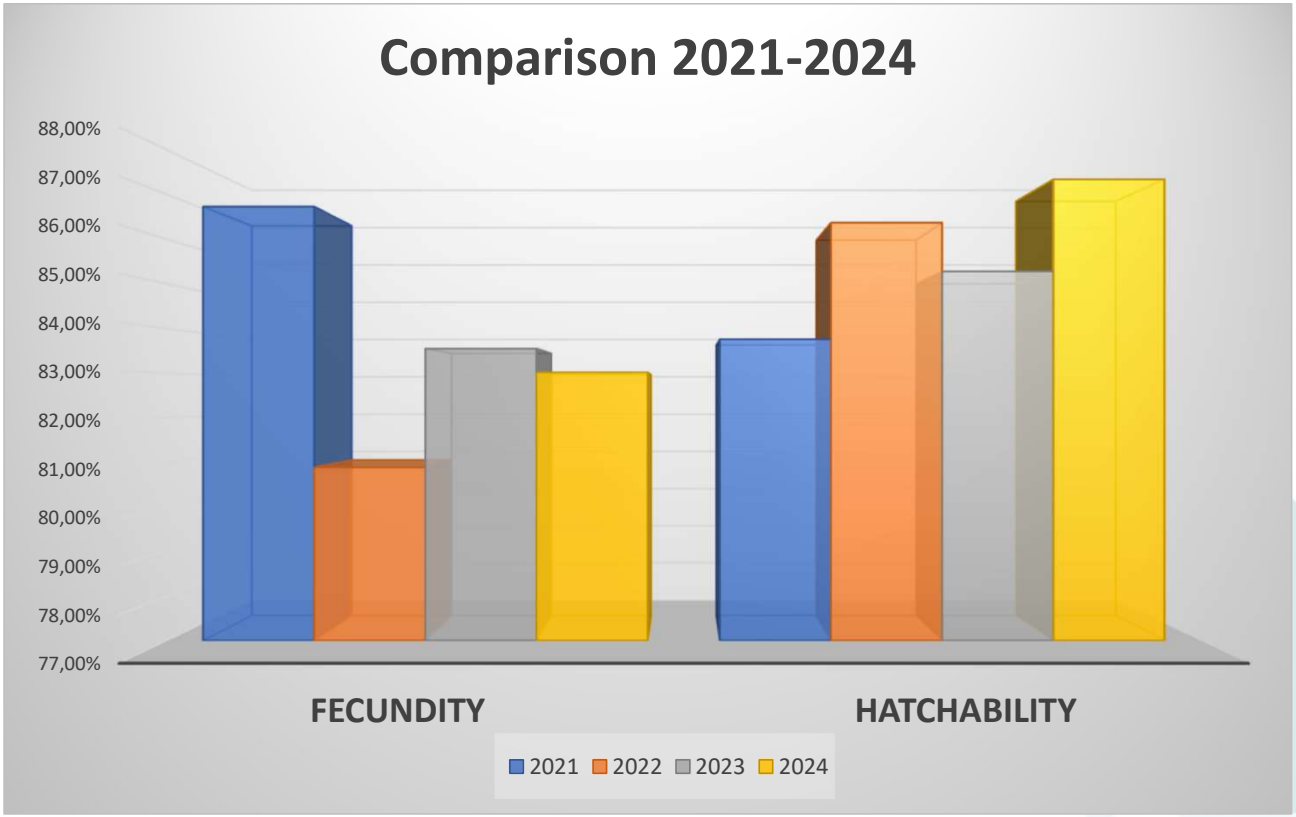
FECUNDITY AND HATCHABILITY

The data collected during the project years make it possible to compare the production of partridges in its various phases from 2021 to 2024.

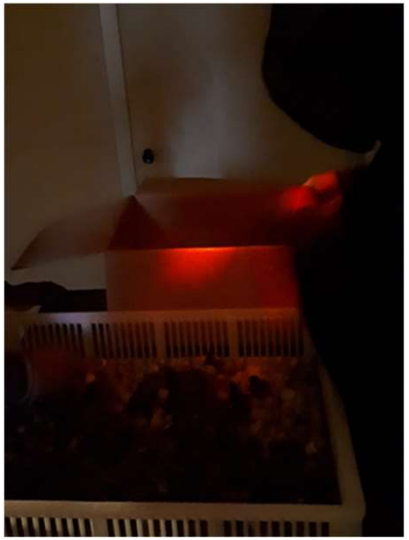
The values have remained constant over time without significant differences.

Subsequent generations of breeding pairs, derived from the initial genetically selected stock, maintained consistent reproductive performance.

Fecundity and hatchability of the eggs have remained within rather narrow ranges over the years.



TRANSFER OF CHICKS TO THE CHICK-HOUSES AND MINIMIZATION OF IMPRINTING ON HUMANS.



One-day-old chicks are transferred to chick-houses takes in the dark, using only red light.

The operators wear a poncho to disguise the human form.

IN THE CHICK-HOUSE

In the first 10 days of life, the chicks are kept in the chick-houses inside circles with a bottom covered with straw and heated with red light lamps fixed to the ceiling.

On day 11, chicks are released from their circles to explore the entire heated chick-house.

Animal heating lamps are kept on until about 20 days of age.

From the 20th to the 30th day the lamps are turned off during the afternoon hours and turned on again at night, from the 30th they are turned off completely.

As temperatures rise and the animals grow, the fans inside the chick houses are also activated.

TRANSFER OF PARTRIDGES TO AVIARIES

Thirty-day-old chicks were transferred to aviaries upon the removal of heat lamps, earlier than planned 45-day schedule. The aviaries were equipped with **5 boxes** that provide shelter and let the young free to go in and outdoors to anticipate their adaptation to free-living. We called this method **“inside-out ”**

A fence is mounted around the box to keep the animals in the adjacent area, once grown the fence is removed to make the entire pre-adaptation aviary available.

The excellent vegetation cover of the aviaries provides a hiding place in case of perception of danger and a shelter during the hottest summer days.

PREPARING AVIARIES

1. Plowing the soil and disinfection with calcium cyanamide,
2. Control of perimeter networks and the sky,
3. Tying the sky net on new aviaries,
4. Seed with specially useful varieties of essences as a natural food source in addition to the feed given.

HATCHING WITH LIGHT HENS

In 2020, to make up for the delayed delivery of the incubator due to the Covid19 health crisis, the first eggs laid by the spawners were given to light hens for hatching.

In 2021, hens hatched eggs laid by ground pairs that laid but did not hatch.

NATURAL HATCHING

YEAR	NO. OF COUPLES ON THE GROUND
2020	19
2021	54
2022	60
2023	100
2024	100

To experiment with natural hatching, small aviaries of about 15 square meters have been built over the years to house breeding pairs, left free to build the nest, lay eggs, hatch and care for the hatchlings.

In the past, several studies have been carried out in the Bieri Center on brooding on the ground and on the possible advantages of this technique(Profumo et al., 2001; Ambrogi et al., 2001; Bagliacca et al., 2002).

ADOPTIONS

This technique takes advantage of the species' natural attachment to offspring and the instinct to care for and defend orphaned hatchlings.

Prerequisite

Females must have started the hatching phase

Two types of adoptions

by a pair placed in the chick house when the chicks are 11 days old (when the circle is removed).
After 10 days, the operators take the couple and 15 chicks and transfer them to an aviary.

from a hatching but unfertilized female taken from **a unisex aviary**, which is transferred to a cage of about 2sqm along with 15 newly hatched chicks. After a week partridge and chicks are transferred to the aviary to leave the cage available for another adoption.

Different from what occurs in artificial hatching, even with this 'semi-natural' method, partridge chicks learn behaviors from their 'adoptive mother' that are useful for free-living, .

NATURAL HATCHING ADOPTION

YEAR	N° BORN BY NATURAL HATCHING	N° BORN BY HATCHING WITH LIGHT HENS	N° OF CHICKS ADOPTED
2020	89	163	_
2021	130	138	_
2022	250	_	_
2023	353	_	400
2024	413	_	220

Some of these birds were used as breeding stock for the following season, while others were released into the Mezzano Valley.

ANTI-PREDATORY TRAINING

Indoor anti-predatory training is done by exposing the broods to an old stuffed fox attached to a stick, waved by an operator.

Outdoors, anti-predatory training trials are conducted with a common buzzard properly guided by its falconer to encourage the animals' tendency to hide under vegetation cover in case of danger.

PHENOTYPIC SELECTION OF GRAY PARTRIDGES TO BE REINTRODUCED

From 2021 to 2024, between August and September, the best specimens of *Perdix perdix italica* were phenotypically selected for release at the Mezzano Valley introduction site.

All the animals were ringed, placed in special plastic baskets and loaded overnight onto the transport vehicle so that they arrived very early in the morning at the release sites.

Special capture areas are built in the aviaries to facilitate the collection of animals and minimize stress.

RELEASES IN THE MEZZANO VALLEYS

YEAR	TRANSFERRED	ARTIFICIAL HATCHING	NATURAL HATCHING ADOPTIONS
2021	5.288	5.250	38
2022	10.040	9.750	290
2023	9.340	8.930	410
2024	5.600	4.992	608
TOT	30.268	28.922	1.346

RELEASE OF THE REPRODUCERS

At the end of each reproductive cycle, the breeding cages are emptied and disinfected.

The birds, after a period spent in the aviaries of the Center for the readaptation to free life, are transferred to the **State Nature Reserves of "Orecchiella and Murge Orientali "** managed by the Carabinieri, where they are monitored by local staff.

WITH THE NEW PHENOTYPIC SELECTION OF BREEDING PAIRS, THE CYCLE STARTS AGAIN

THANK YOU FOR YOUR ATTENTION