



**SEJARAH SUKSES APLIKASI
TEKNOLOGI REPRODUKSI UNTUK KONSERVASI SPESIES
(Mencegah Kepunahan Spesies)**



1. Pengembangbiakan berdasarkan Analisis Genetik (Meningkatkan Keragaman Genetik)

CALIFORNIA CONDOR



Asal dari 27 burung pada 1987 Menjadi 463 burung pada 2017

https://www.fws.gov/cno/es/CalCondor/PDF_files/2017-CA-condor-population-status.pdf

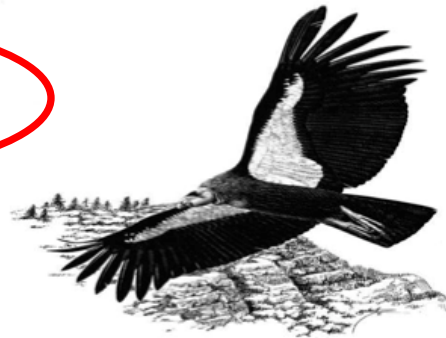
California Condor *Gymnogyps californianus* Recovery Program

Population Size and Distribution

January 31, 2014

Overview Page

Refer to the subsequent pages for details and trends:



TOTAL POPULATION

WILD POPULATION

California (Managed by US Fish & Wildlife Service, Ventana Wildlife Society, Pinnacles National Park)

Chicks - in wild nests (PNP=0, SoCal=0, VWS=0)

Free-flying birds - Released & Fledged - **Southern California (USFWS)**

SoCal Fledged = 18

Free-flying birds - Released & Fledged - **Ventana Wildlife Society (VWS)**

VWS Fledged = 9

Free-flying birds - Released & Fledged - **Pinnacles National Park (PNP)**

PNP Fledged = 1

Baja California, MX, Sierra de San Pedro Martir NP (SPM), Zoological Society of San Diego

Chicks - in wild nests

Free-flying birds - Released & Fledged

Baja Fledged = 2

Arizona, Vermilion Cliffs, The Peregrine Fund (World Center for Birds of Prey)

Chicks - in wild nests

Free-flying birds - Released & Fledged

Arizona Fledged = 10

CAPTIVE POPULATION

Los Angeles Zoo

San Diego Zoo Safari Park (Display: 29, 36, 497, 524)

San Diego Zoo - 319, 471, 500

World Center for Birds of Prey, Boise, ID, The Peregrine Fund

Oregon Zoo, Portland, OR

Chapultepec Zoo, Mexico City - 86, 140

Santa Barbara Zoo - 174, 227, 422, 464, 544

410

232

128

0

70

31

27

29

0

29

75

1

74

178

26

31

3

55

39

2

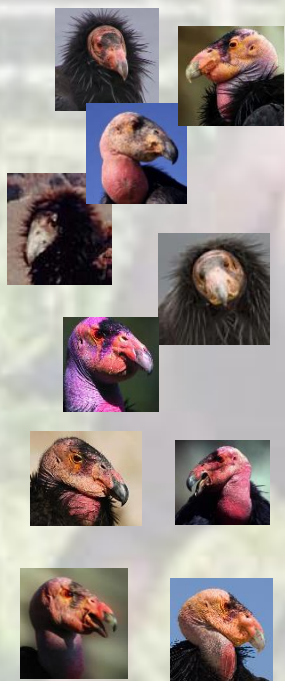
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In 1987, the last wild condor was removed from the wild.

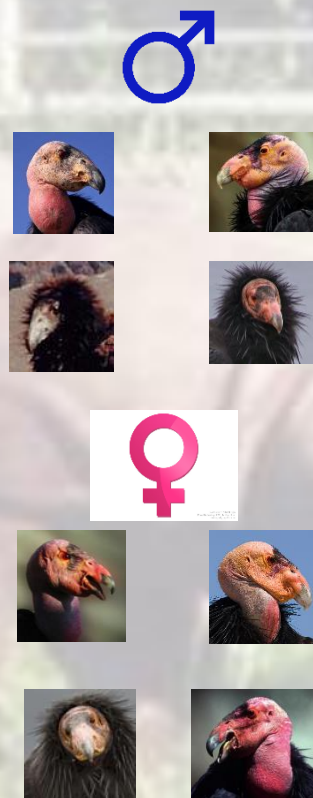
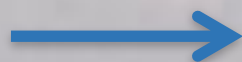
27 condors left in the world were being kept in various breeding facilities. The F0 generation was merely 16 birds.

Strategi Penangkaran berbasis pada Genetik

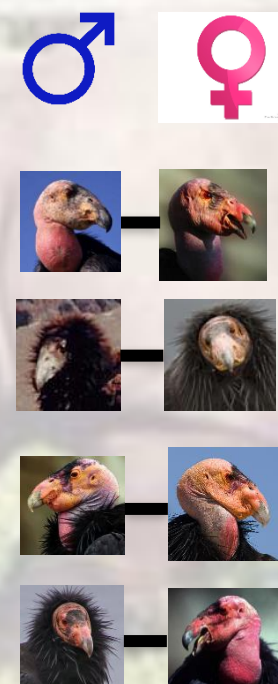
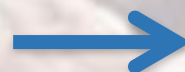
Dari Stok → Pengembangbiakan → Dipasangkan



available
diversity



retain
diversity



maximize
heterozygosity

Contoh keberhasilan konservasi burung Californian Condor. Pasangan burung berbasis analisis genetik
“Memaksimalkan Keragaman Genetik”



**PENGEMBANGBIAKAN DENGAN BANTUAN
“TEKNOLOGI REPRODUKSI BERBANTU” (*Assisted
Reproductive Technology / ART*)**

INSEMINASI BUATAN PADA BANTENG DI TSI

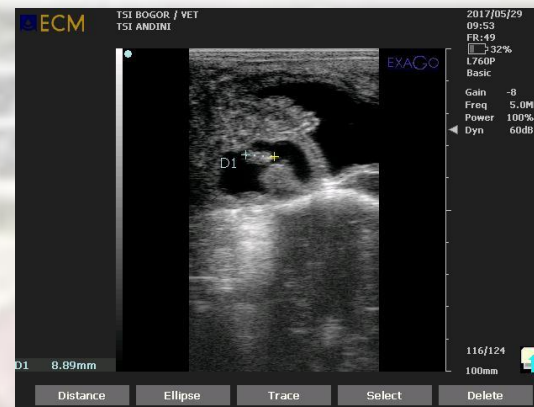
Pregnancy Diagnosis



Semen Collection



Insemination



3 Calves were already produced at TSI Bogor

BLACK-FOOTED FERRET

- Hampir punah pada 1981 → 18 Ferret ditangkap di USA 1985-1987
- 1996-2008 →
 - Koleksi Semen dan Krio-preservasi
 - Inseminasi Buatan Intra (Intra uterin AI)
 - 140 bayi Ferret dihasilkan dari program Intra uterin AI
 - 8 bayi Ferret dihasilkan dari semen beku yang disimpan 20 tahun
 - 120-250 Ferret sudah dilepasliarkan di alam
 - Total 4500 Ferret sudah dilepasliarkan ke alam sampai sekarang





In-Vitro Fertilization and/or Intra Cytoplasmic Sperm Injection (IVF and ICSI)



NORTHERN AFRICAN WHITE RHINO

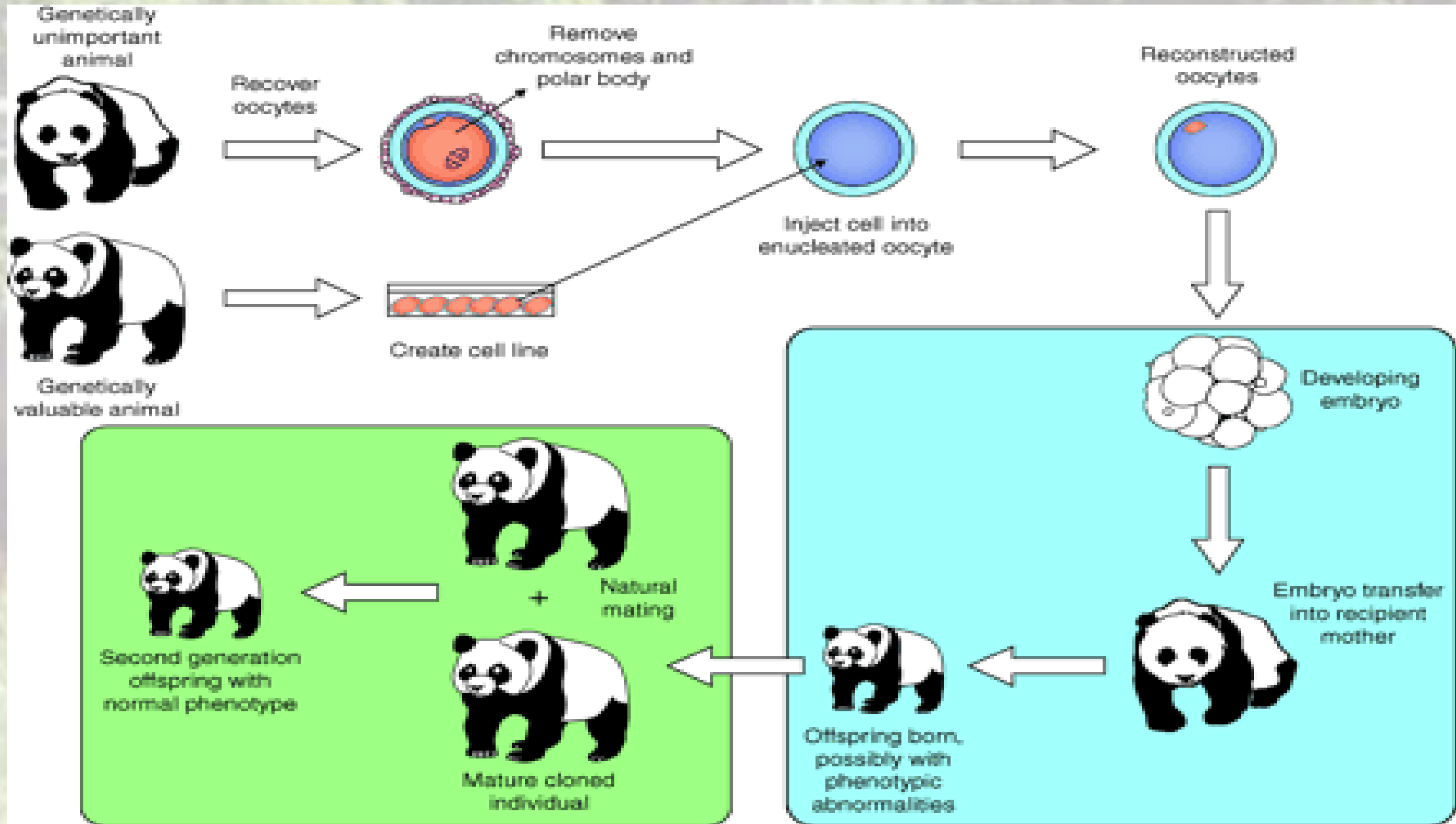
- IUCN 2020 → Extinct in the Wild
- 2019 → Tinggal 3 badak Northern African White Rhino tersisa di
 - 1 ♂ “SUDAN”, KB Dvůr Králové Zoo di Ceko → Kembali ke Kenya
 - 2 ♀ “NAJIN dan FATU”, di Kenya (Kenya Wildlife Services)
- 2019 – 2022 → Mengerjakan ART dengan koleksi “sel telur” dan “Sperma” dan “ICSI” telah menghasilkan 24 EMBRIO pada April 2023 yang dikerjakan oleh **TIM IZW** (Institute for Zoo and Wildlife Research)



Somatic Cell Nuclear Transfer (SCNT) CLONING

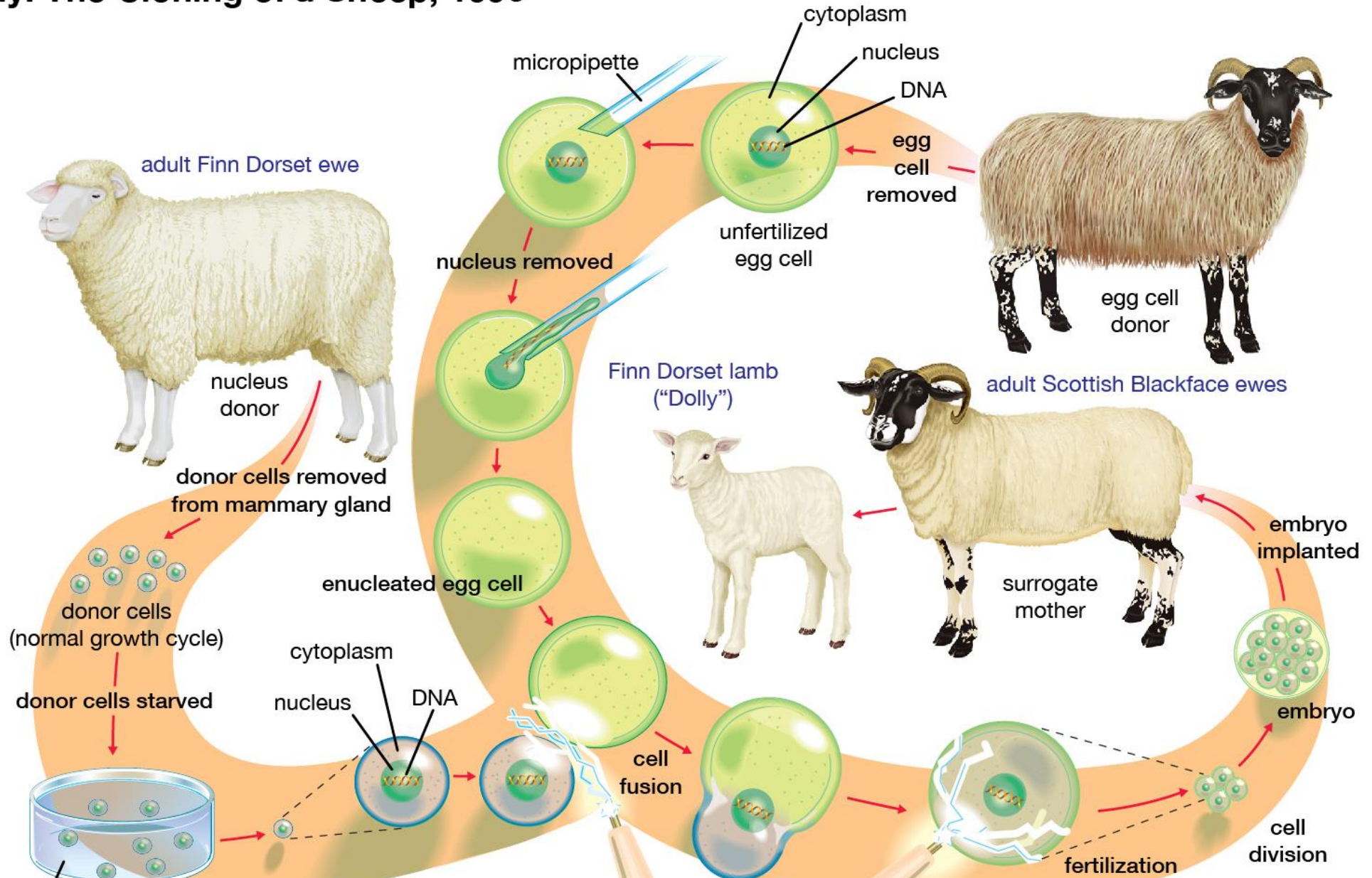


SOMATIC CELL NUCLEAR TRANSFER (SCNT)



SOMATIC CELL NUCLEAR TRANSFER (SCNT)

Dolly: The Cloning of a Sheep, 1996



PILIHAN ART PADA BADAK SUMATERA

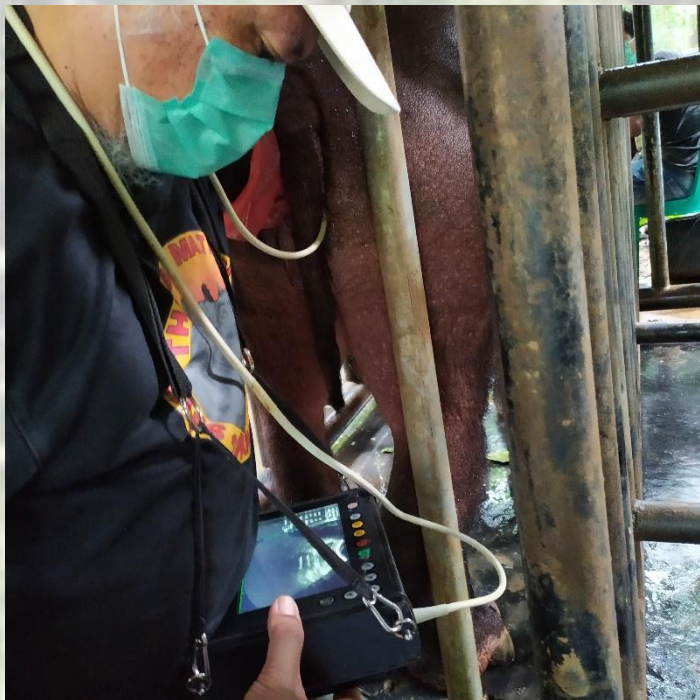
➤ FACT

- Badak ♀ > 70 % →
 1. Kista dan tumor pada Uterus & Serviks
 2. Sulit Bunting
- Badak ♂ hanya menghasilkan sangat sedikit sperma (*Oligozoospermia*) & tinggi abnormalitasnya



ART in SUMATRAN RHINO

INTRA CYTOPLASMIC SPERM INJECTION (ICSI)





Bio-bank

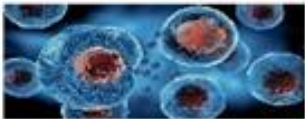


Badak Sumatra dalam Freezer

Badak Sumatra Dalam bentuk Sampel yang Dikoleksi dari Seluruh Badak di Penangkaran



Sperma



Pluripoten stem cell



Embrio



Sel dan jaringan lain



➤ Roadmap ART & Bio-bank Sumatran Rhino Year 2022-2027

(Letter of Director KKH: No. S.1305/KKH/AJ/KSA.2/12/2019, 27 DeCember 2019)

Transfer of Sumatran Rhino Embryo to ***Surrogate Mother***

Assesment of ***Surrogate Mother*** for embryo transfer

Development of iPSC and Embryo Production

2027

2026

2025

2024

Introduction to induce Pluripotent Stem Cell (iPSC) production, Sperm and Egg Collection, Embryo Production and Bio-bank

2023

Construction of ART & Bio-bank Laboratory and Development of the Center for ART and Bio-bank (FKH IPB), Propagation and Technology Application: Natural Breeding, Sperm and Egg Collection, AI trial, ICSI and Bio-bank Application

2022

Assesment of individual Reproductive Status (♂ & ♀ rhinos) at SRS, Whole Genome Analysis (Whole Genome mapping), and Sperm Collection

An aerial photograph of a university campus. In the foreground, there are several buildings with red roofs and white walls, surrounded by dense green trees. In the middle ground, a large, multi-story building with a prominent red roof and white facade stands out. The background features a vast, hazy valley leading up to a large, rugged mountain range under a blue sky with scattered clouds.

TERIMA KASIH
Hatur Nuhun
Thank You