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Combination of retinography and RFID (Rtn+EID) for an advanced imaging identification in mouflons (*Ovis orientalis musimon, Gmelin* 1774)

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Map of Europe, "*Theatrum Orbis Terrarum*" by Abraham Ortelius. Anversa, 1570

nimal Identification

evices

lectronic
dentification (EID)

nterdisciplinary
pproach

etinography

- **Good farming practice**
  - ✓ Farm and animals management
- **EU Regulations**
  - ✓ 21/2004 EU Regulation, i. e.
- **Traceability**
  - ✓ 178/2002 EU Reg;
  - ✓ Origin protection of food of animal origin
- **Public health**
  - ✓ Zoonosis/foodborne disease
- **Monitoring of wild animals**
  - ✓ Epizoozies, biodiversity safeguard, environmen

GENERAL PRE-REQUIREMENTS OF DEVICES FOR ANIMAL IDENTIFICATION DEPLOYMENT

ON FIELD PERFORMANCE

- Ease activities
- Reduce errors
- Reliable
- Easy to share
- Grant information flow

TECHNICAL CHARACTERISTICS

- Univocable and clear
- Repeatedly constant
- Fraud proof
- Carrier of information

ANIMAL WELFARE COMPATIBILITY

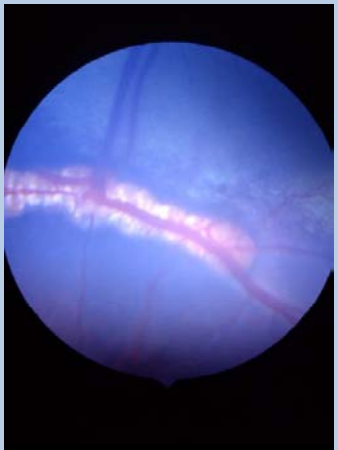
- Safe and harmless
- Adapted to anatomo-physiology of different animal species

Experience RFID technology in different animal species for different purposes, in relation to:

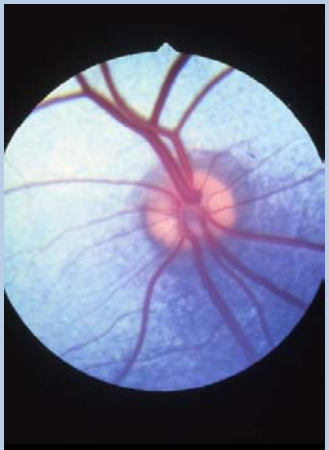
- **Farm animals productive performance**
- **Animal welfare**
- **Animals and animal products traceability**
- **Sanitary reasons**

The RFID technology for Electronic Identification (EID) of animals offers several opportunity such as:

Creation of REAL TIME DATABASE at each control on field (farm animal or wild animal) hosting each INDIVIDUAL CODE (transponder) paired to biological data, in the QUICKEST WAY, with LOWEST ERRORS occurrence, ready to be IMPLEMENTED and SHARED

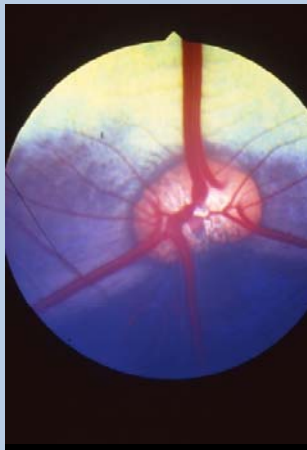


Dama Dama, Linneus K., 1758



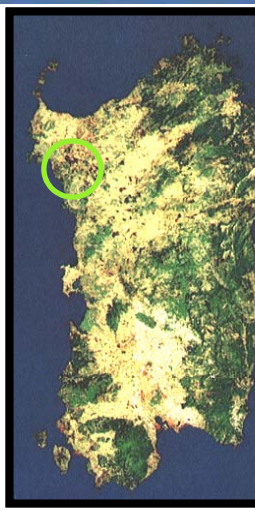
Capra hircus, Linneus K., 1758

Ovis aries, Linneus K., 1758

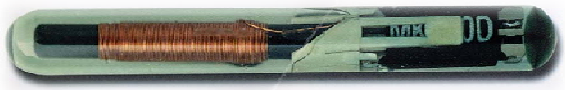


Ovis musimon, Gmelin, 1774

ANIMALS:
30 adult mouflons were electronically identified (EID)



DEVICE:
Passive HDX transponder
32.5 3.8 mm,
ISO 11784-11785 Tiris 32 mm
administered by ceramic boluses
(75 g. 70x21 mm RUMITAG bolus®)



RETINOGRAPHIES

normally constrained,
with no use of sedation,
12 retinographies
(6 shots per eye)

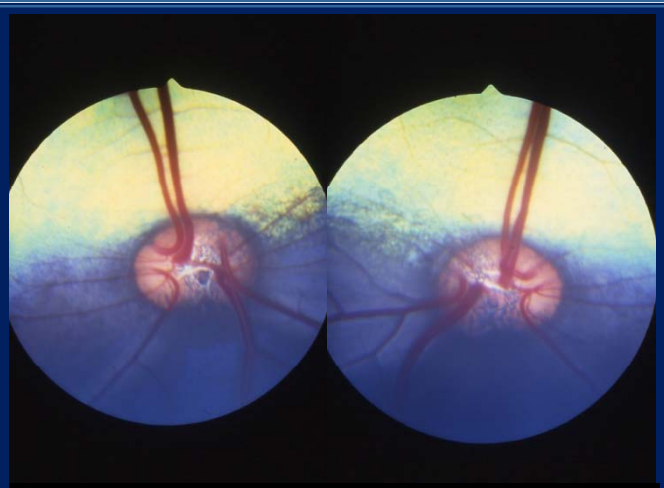
Kowa RC–2 retinograph

At controls:

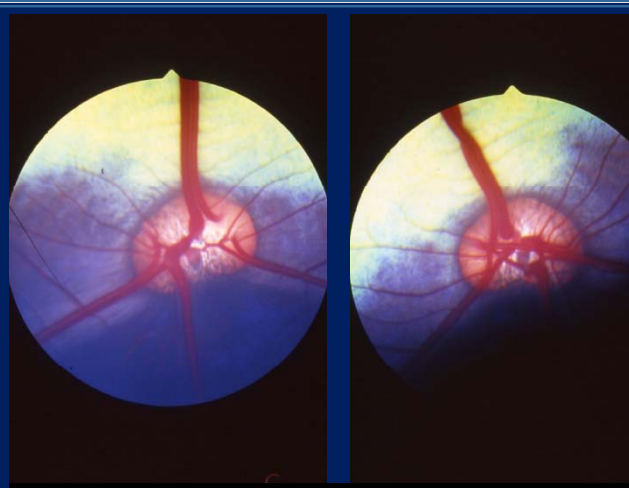
1 . Transponders individual code of each animal was read by static and dynamic readings

2. Retinographies of both eyes from each EID mouflon were compared and uploaded in a database.

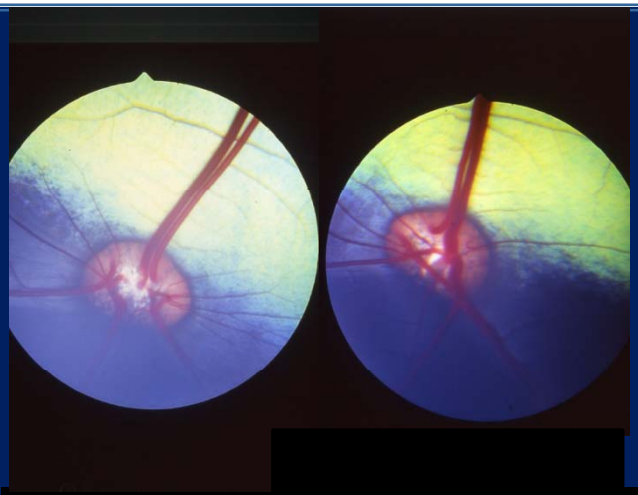
3. The evaluation of retinographies as a biologic datum for animal identification was carried out



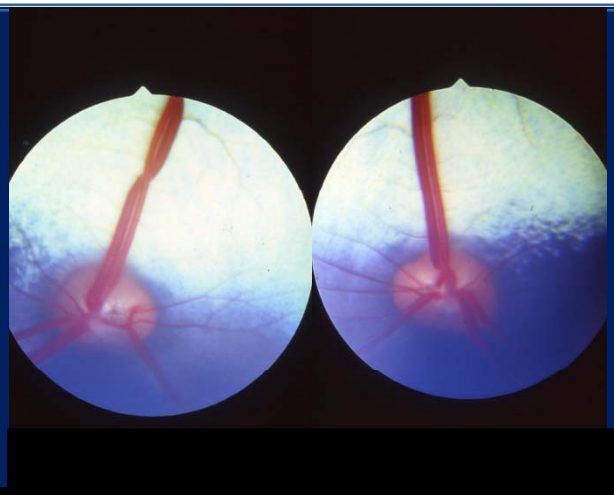
Ovis orientalis musimon, EID 2568146 (L and R fundus of the eye)



Ovis orientalis musimon, EID 2568147 (L and R fundus of the eye)



Ovis orientalis musimon,
EID 2568148 (L and R fundus of the eye)
MOTHER



Ovis orientalis musimon,
EID 2568149 (L and R fundus of the eye)
SON

In focus:

1 . The peculiar pattern observed in the fundus of the eye of EID mouflons allows to identify each animal according to individual univocable and constant behaviour of vessels as far as emergence from the papil, number, pathways and veins associated to arteries.

2. In a same mouflon, left eye pattern is different from right eye pattern.

3. The individual and univocable pattern can be considered as a fingerprint for animal reliable identification on biologic datum basis associated to RFID technology.

In focus:

1 . The score attributed to the integrated system Rtn + EID leads to think that also in the animal sector the retinography can be used as a biologic tool to assess individual identity, as in humans.

2. The difference between patterns from left and right eyes of a same mouflon allows to have more informative images

Materials and methods

Results

Discussion

Conclusions

Into a perspective

Achievements:

1. The integrated system Rtn + EID in mouflons appears a reliable method for animal identification as it offers the opportunity to link a digital code to a biologic datum

2. The creation of a real time database at reading of transponders code of each mouflon by dynamic readings with highly informative digital images gives the chance to trace both the electronic code and the fingerprint

3. The system can be used to monitor wild animals in a reliable, accurate and compatible to animal welfare and on field practice way for different purposes (biodiversity protection, landscape monitoring, etc…)

Opportunities

We believe that these findings pave the way to developed technologies for digital information exchange, where the digital imaging will be the basis for conveying large amounts of information into a digitalised compacted system