

LIFE13 BIO/IT/000204 U-SAVEREDS
Management of grey squirrel in Umbria:
conservation of red squirrel and preventing loss of biodiversity in Apennines



HEALTH STATUS OF GREY SQUIRRELS
(*Sciurus carolinensis*):

RESULTS OF LIFE PROJECT U-SAVEREDS



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LIFE13 BIO/IT/000204 PROJECT U-SAVEREDS

October 2014 – October 2018



HOW???

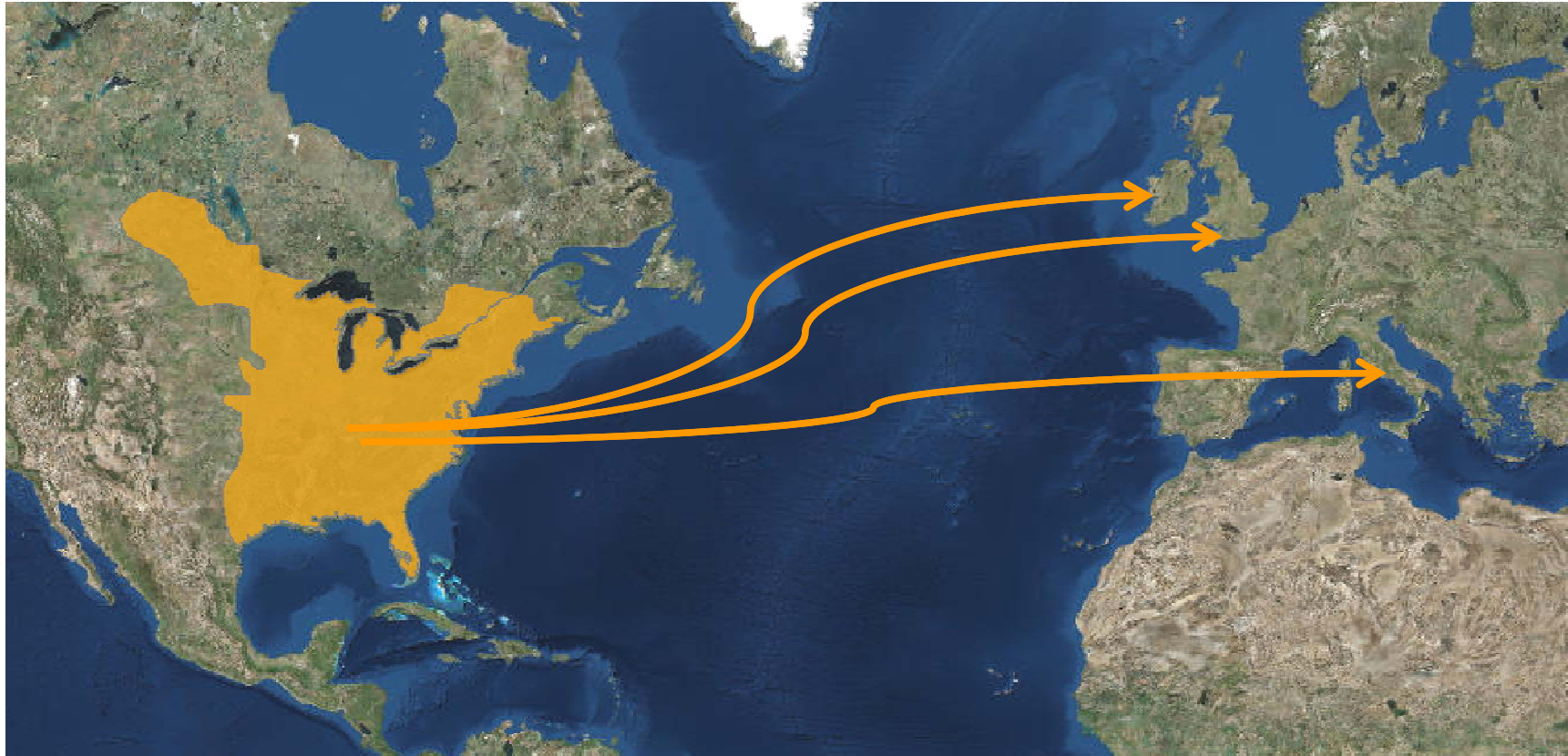
- **Direct removal:** capture and euthanasia
- **Indirect removal:** capture, surgical sterilization and release

WHY???

EU Regulation n. 1143/2014
for removal of grey squirrel



EASTERN GREY SQUIRREL *Sciurus carolinensis*



- Invasive Alien Species (IAS)
- Species that can be close to humans
 - Found in urban areas
- “Competitive exclusion” with red squirrel

Ecological and sanitary negative impacts

● Istituto
Zooprofilattico
Sperimentale
dell'Umbria e
delle Marche
"Togo Rosati"
(IZSUM)

● **ACTION A.5:**
Protocol for
Sanitary
Screening (**POIS**)

● **ACTION C.4:**
POIS
application



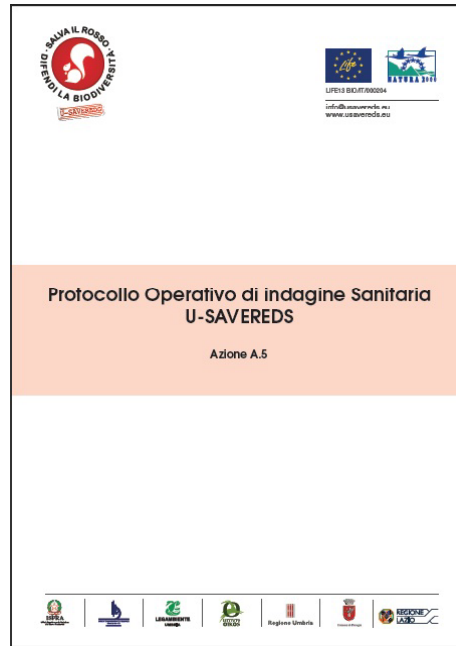
POIS

✓ Scientific literature
(articles, reviews, ...)

✓ Selection of pathogens
to investigate



- **Direct** diagnostic tests
- **Indirect** diagnostic tests



Parte Prima

1	Introduzione	7
2	Patogeni potenzialmente rilevanti	9
2.1	Dermatofiti	
2.2	Lievit	
2.3	Chlamydia spp.	
2.4	Trichosporium pandoi	
2.5	Leishmania spp.	
2.6	Fructifera zoluzente	
2.7	Batteri, virus e protozoi trasmessi da zecche	
2.8	Parviri	
2.9	Adenovir	
2.10	Sistemi di immunologia transcutanea	
3	Studio della fertilità	17

Parte Seconda

4	Campionamento	21
4.1	Definizione del campione	
4.2	Raccolta del campione	
5	Parte analitica	25
5.1	Specifiche delle tecniche diagnostiche	
5.2	Studio della fertilità	
6	Risposte gestionali	29
	Bibliografia	33
	Indice	37

SAMPLING PROTOCOL (Action C.1)

Target
groups

*Sciurus
carolinensis*
captured and
euthanised

Sciurus sp.
road killed

*Sciurus
vulgaris*
captured, tagged
and released

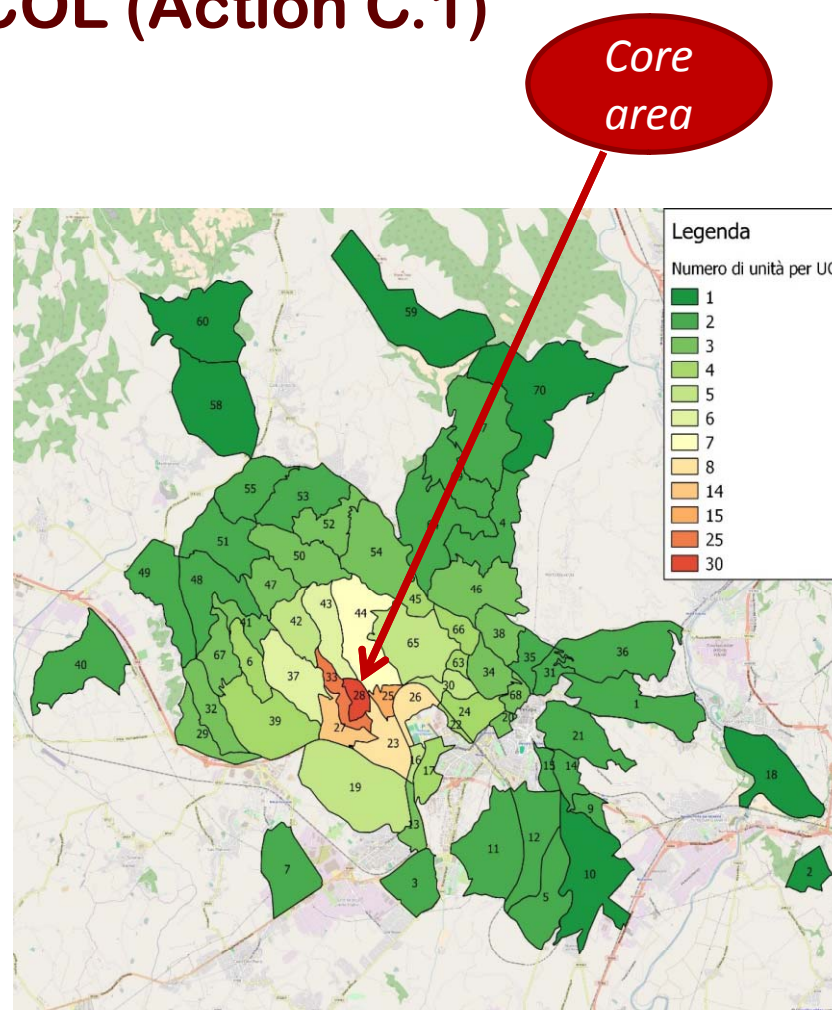


SAMPLING PROTOCOL (Action C.1)

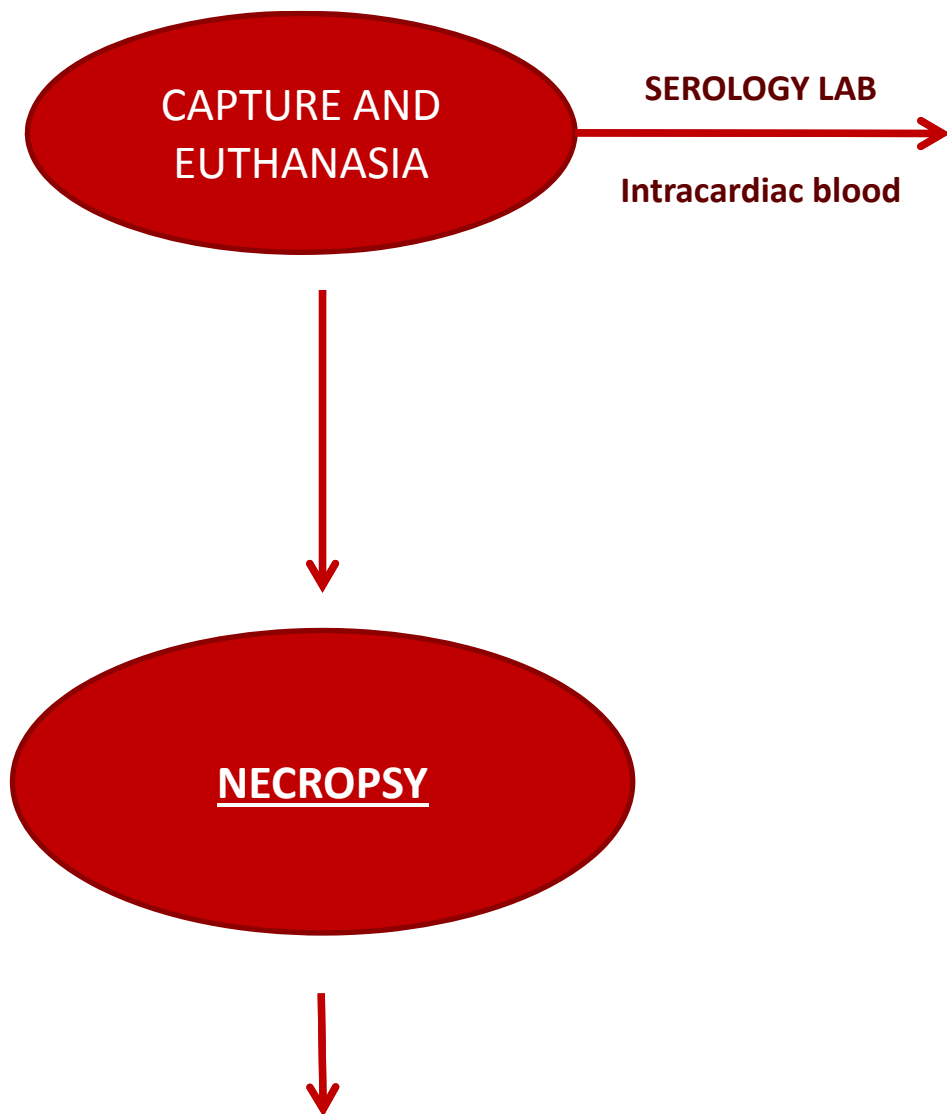
- 1500 grey squirrels
- LC: 95%
- Prevalence: 1%

Direct removal of **271**
grey squirrels:

1. Capture by Tomahawk Live Trap
2. Euthanasia by CO₂ inhalation
3. Data collection (alphanumeric code, sex, weight, reproductive conditions)
4. Field sampling: intracardiac blood, ectoparasites
5. POIS application at IZSUM "Togo Rosati" (Action C.4)



POIS APPLICATION (Action C.4)



Pathogen	Matrix	Diagnostic technique
<i>Toxoplasma gondii</i>	Serum (CNS)	Latex test (PCR if positive)
<i>Leptospira</i> spp.	Serum (Kidney)	MAT (PCR if positive)
<i>Francisella tularensis</i>	Serum (Spleen, liver e kidney)	MAT (PCR if positive)
<i>Chlamydia</i> spp.	Serum (Lung, reproductive apparatus)	CFT (PCR if positive)
Poxvirus	Serum (Eyelid)	ELISA (PCR if positive)



NECROPSY



BACTERIOLOGY LAB



MYCOLOGY LAB



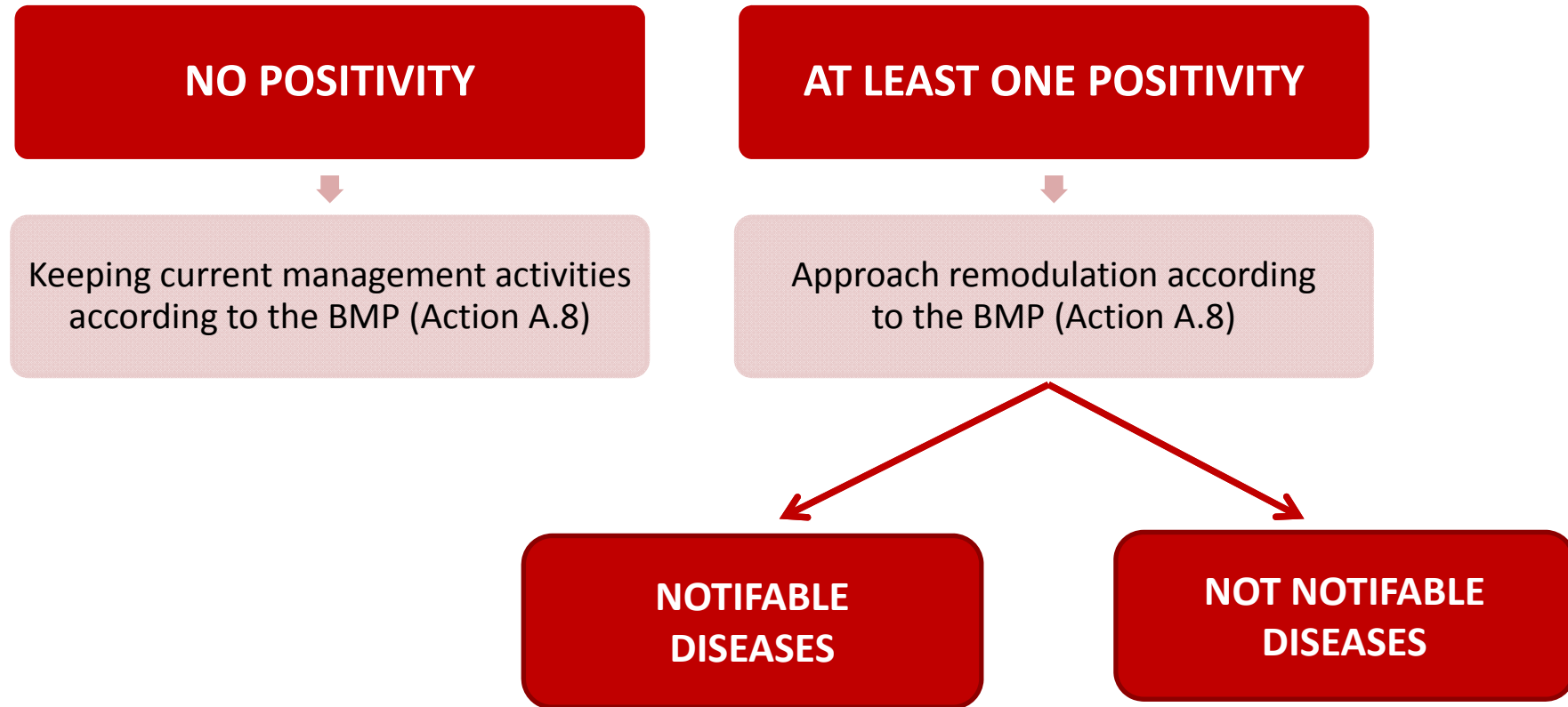
MOLECULAR BIOLOGY LAB



VIROLOGY LAB

Pathogen	Matrix	Diagnostic technique
Bacteria	Rectal swab Liver, brain, lung	Standard bacteriological examination
Dermatophytes	Fur	Cultural exam <i>(PCR if positive)</i>
Yeast	Oral swab Rectal swab Utero-vaginal swab	Cultural exam
<i>Coxiella burnetii</i>	Spleen, ticks	PCR
<i>Borrelia spp.</i>	Spleen, ticks	PCR
<i>Rickettsia spp.</i>	Spleen, ticks	PCR
<i>Babesia spp.</i>	Spleen, ticks	PCR
<i>Anaplasma spp.</i>	Spleen, ticks	PCR
Flavivirus	Spleen, ticks	PCR
Adenovirus	Liver, intestine	PCR

MANAGEMENT FEEDBACK



- World Organisation for Animal Health (D.P.R. 8 febbraio 1954, n. 320)
- Regolamento di Polizia Veterinaria e Decreto Ministeriale 15 dicembre 1990
- Sistema informativo delle malattie infettive e diffusive

**NOTIFIABLE
DISEASES:**

- Q Fever (*C. burnetii*)
- Rickettsiosis (*Rickettsia* spp.)
- Tularemia (*F. tularensis*)
- Leptospirosis (*Leptospira* spp.)
- Psittacosis (*C. psittaci*)
- Dermatophytosis (dermatophytes)

INDIVIDUAL-DIPENDENT RESPONSE :

Increase catch rate

NO sterilization or release of grey
squirrels



AREA-DIPENDENT RESPONSE :

NO translocation or reinforcement
of red squirrel populations

NO release of sterilized grey squirrel

**NOT NOTIFIABLE
DISEASES:**

Other diseases:

- transmissible to humans (**zoonosis**)
- transmissible to other wild animals
- transmissible to pets

MANAGEMENT RESPONSE DEPENDING
ON THE MU WHERE THE DISEASE
OCCURRED

Examples:

- "City center and high-density neighborhoods"
- "Urbanized area with a high percentage of public/private parks"
- "Urbanized area immersed in the wooded matrix"
- "Città della Domenica"

> Sample size for sanitary investigations

RESULTS

(at January 2018)

142 grey squirrels analyzed :
good body conditions



NO external lesions or macroscopically evident internal lesions at necropsy

EXCEPT

alopecic areas in some animals

NO pathogenic germs at Standard Bacteriological Examination

EXCEPT

Escherichia coli isolated from several rectal swabs but considered as part of the normal intestinal flora

Candida albicans:
4 positives

BUT

not to be considered alarming for public health

RESULTS

(at January 2018)

***Coxiella burnetii*:**

2 positives (1,4%)

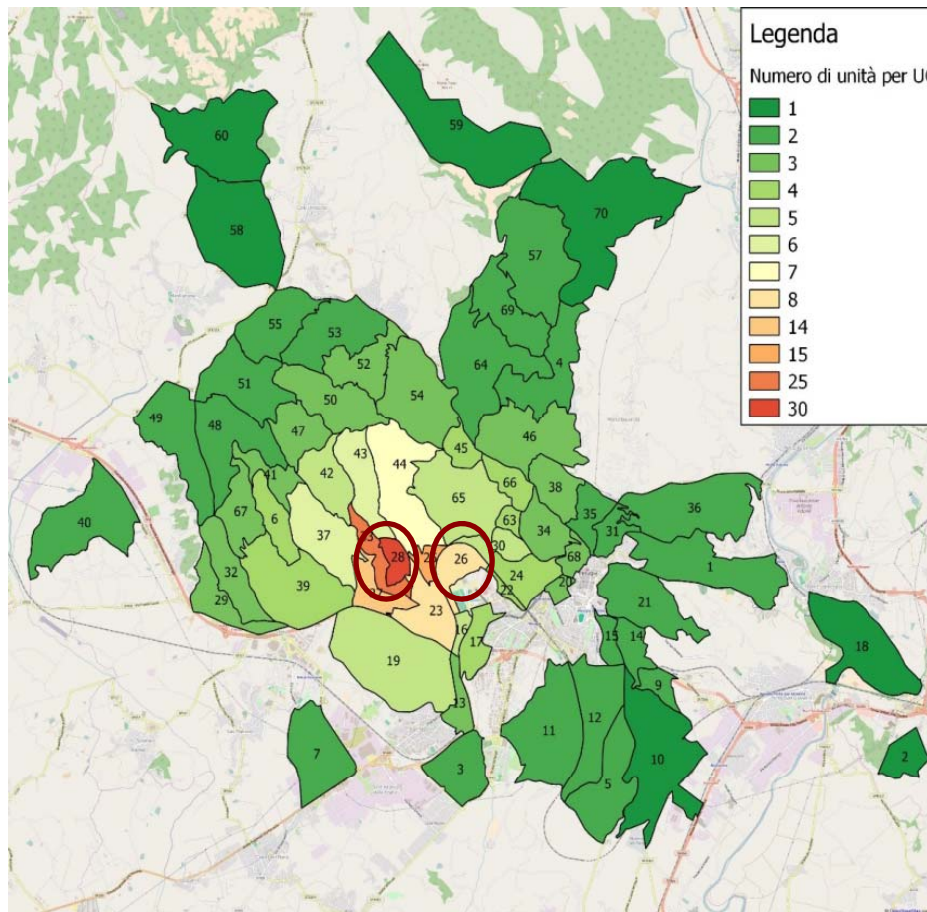
(MU 28)



Q Fever

Notifiable disease:

Individual-dependent
response
+
Area-dependent
response



***Borrelia lusitaniae*:**

1 positive (0,7%)

(MU 26)



Lyme's Disease

**Not notifiable
disease**

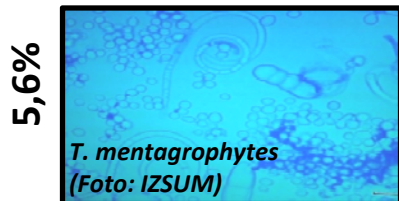
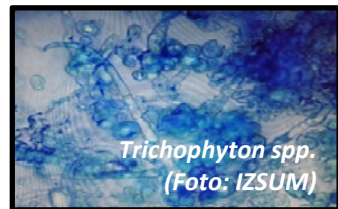
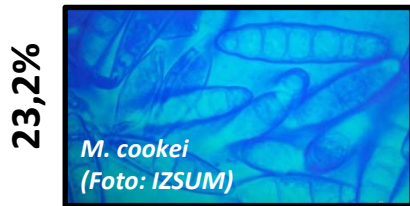
On 142 grey squirrels analyzed

RESULTS (at January 2018)

Dermatophytes:
46 positive samples
on 142 analyzed
(32.4%)



4 different fungal species:



ID UG	N° of analyzed	N° of positives	N° positives/dermatophyte
4	2	1 (50%)	1 <i>Microsporium cookei</i>
19	1	0	/
23	3	1 (33,3%)	1 <i>Microsporium cookei</i>
26	10	3 (30%)	3 <i>Microsporium cookei</i>
27	14	0	/
28	41	18 (43,9%)	3 <i>Trichophyton mentagrophytes</i> 13 <i>Microsporium cookei</i> 2 <i>Trichophyton ajelloi</i>
33	28	10 (35,7%)	4 <i>Trichophyton mentagrophytes</i> 6 <i>Microsporium cookei</i>
37	4	0	/
38	3	2 (66,7%)	2 <i>Microsporium cookei</i>
39	3	2 (66,7%)	2 <i>Microsporium cookei</i>
44	16	1 (6,25%)	1 <i>Trichophyton mentagrophytes</i>
46	3	2 (66,7%)	1 <i>Microsporium cookei</i> 1 <i>Trichophyton thuringiense</i>
64	8	3 (37,5%)	2 <i>Microsporium cookei</i> 1 <i>Trichophyton thuringiense</i>
65	6	3 (50%)	1 <i>Trichophyton ajelloi</i> 2 <i>Microsporium cookei</i>
	142	46 (32,4%)	

CONCLUSIONS



Potential
source of
zoonosis

- Children
- Elders
- Immunodeficient people

} YOPI

32.4%
Dermatophytosis

- Overabundance
- Direct contact
- Environmental load

Further
investigations

- Serum
- Organs

**THANK YOU
FOR YOUR
ATTENTION**

