

**Fabrizio Agnoletti**

**Istituto Zooprofilattico Sperimentale delle Venezie**



Mission: prevention, control and research activities in 3 main areas:

- animal health and welfare
- food safety
- environmental protection

[www.izsvenezie.it](http://www.izsvenezie.it)

# Istituto Zooprofilattico Sperimentale delle Venezie

High density of livestock farms

High density of **rabbit farms**

**40 % of the overall italian production of rabbit is concentrated in the Veneto region**



# ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLE VENEZIE

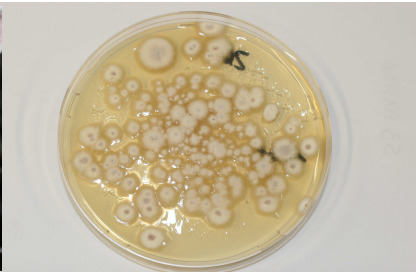
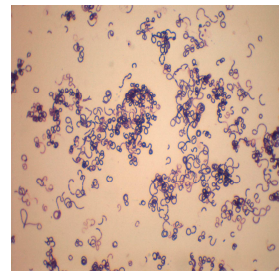
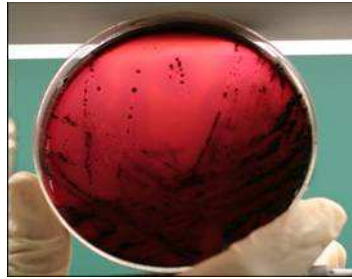
High density of livestock farms  
High density of **rabbit farms**

Development of considerable expertise on the **diagnosis** of the pathologies encountered in intensive rabbit farms

Remarkable **research activity**

Our customers: farmers, technicians, veterinarians, feed and pharmaceutical companies, public veterinary services etc.

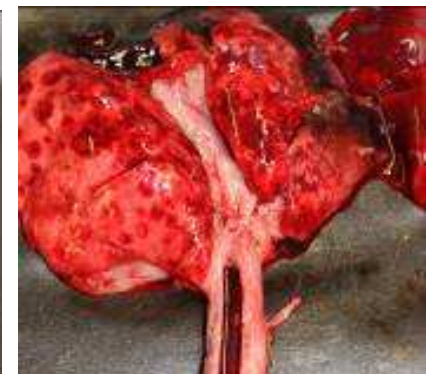
# Diagnosis of rabbit diseases



**Bacterial diseases**

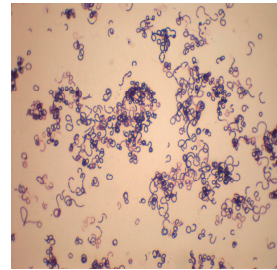
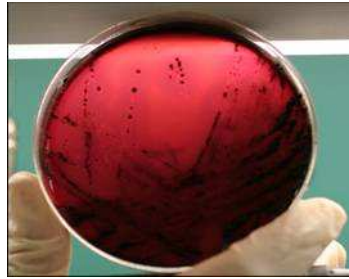
**Viral diseases** →

**Parasitic diseases**



Real time PCR for MV and RHDV

# Diagnosis of rabbit diseases



**Bacterial diseases**

Enteric pathogens

Skin/reproductive pathogens

Respiratory pathogens

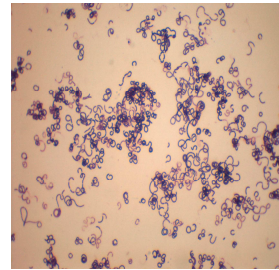
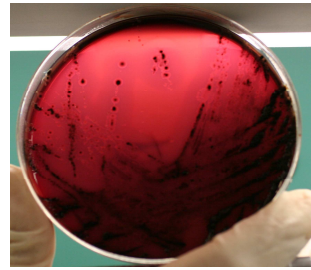
*Escherichia coli*  
*Klebsiella pneumoniae*  
*Salmonella* sp.  
*Clostridium* sp.

Viral diseases

Parasitic diseases



# Diagnosis of rabbit diseases



**Bacterial diseases**

Enteric pathogens

Skin/reproductive pathogens

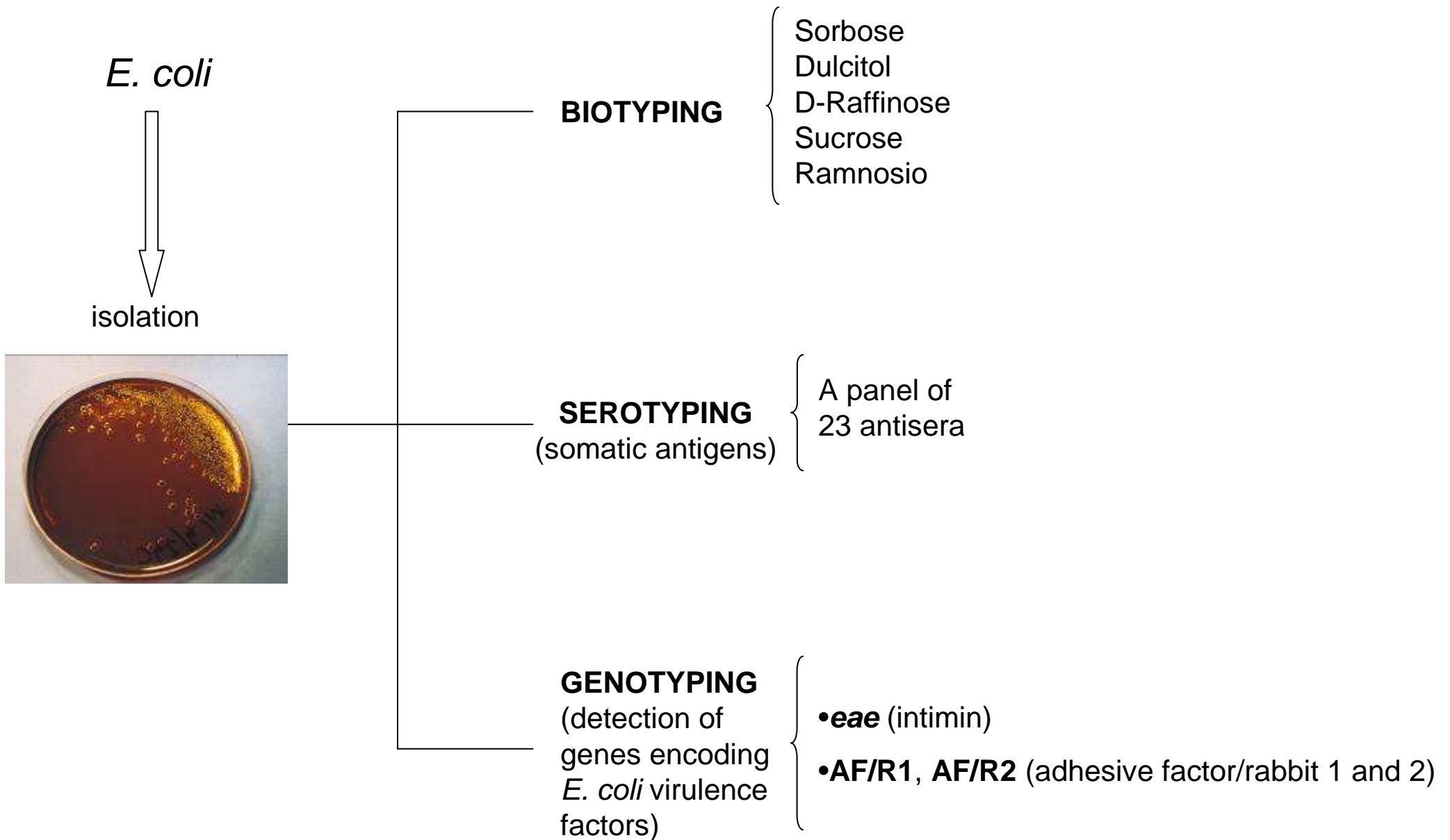
Respiratory pathogens

*Staphylococcus aureus*  
*Pasteurella multocida*

Viral diseases

Parasitic diseases

# From isolation to further characterization of enteric (bacterial) pathogens

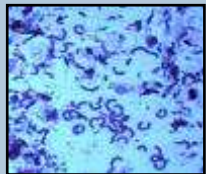


# From isolation to further characterization of enteric (bacterial) pathogens

*Clostridium spiroforme*



Bacterioscopic examination



isolation



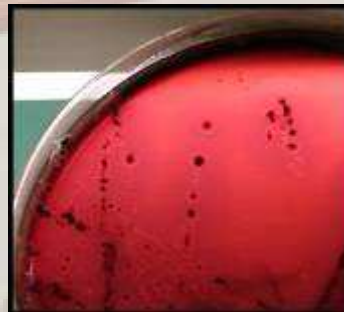
PCR: identification

PCR: binary toxin

*Clostridium perfringens*



isolation



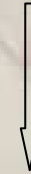
**Toxinotyping**

- **multiplex PCR:** detection of  $\alpha$ ,  $\beta$ ,  $\epsilon$  and  $\iota$  toxins encoding genes

- **duplex PCR:** detection of  $\beta 2$  and enterotoxin encoding genes

- **duplex PCR:**  $\beta 2$  atypical/consensus

*Clostridium difficile*



isolation



- Biochemical identification

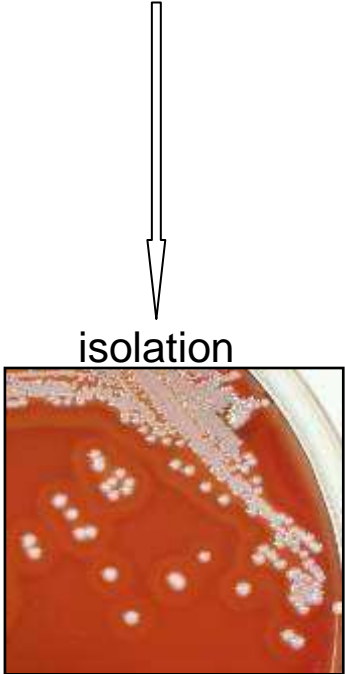
- **multiplex PCR:** identification and detection of toxins A and B encoding genes

- **multiplex PCR:** detection of binary toxin encoding genes



# From isolation to further characterization of skin/reproductive pathogens

*Staphylococcus aureus*



## BIOTYPING

- Beta-haemolysin
- Staphylokinase
- Coagulation of bovine plasma
- Crystal-violet reaction

## IDENTIFICATION (PCR)

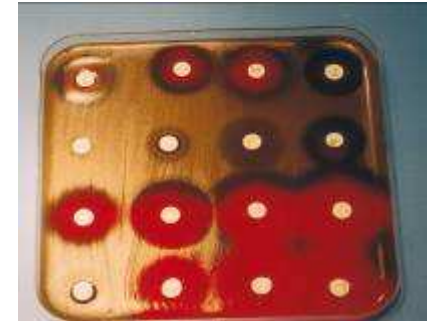
## DETECTION OF METHICILLIN RESISTANT STRAINS (*mecA* gene)



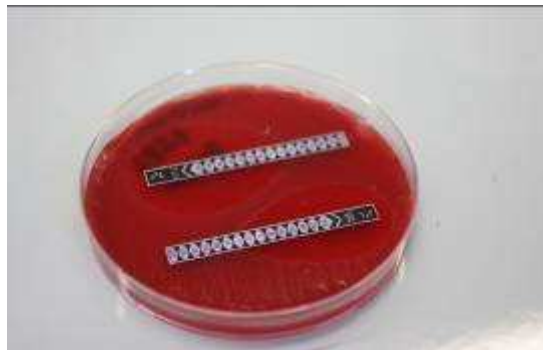
# ANTIMICROBIAL SUSCEPTIBILITY TESTING

(for therapy, research, cooperation with pharmaceutical companies)

1. **Disk diffusion test** (Kirby Bauer method)



2. **MIC** (Minimum Inhibitory Concentration)



E-test



Agar dilution method



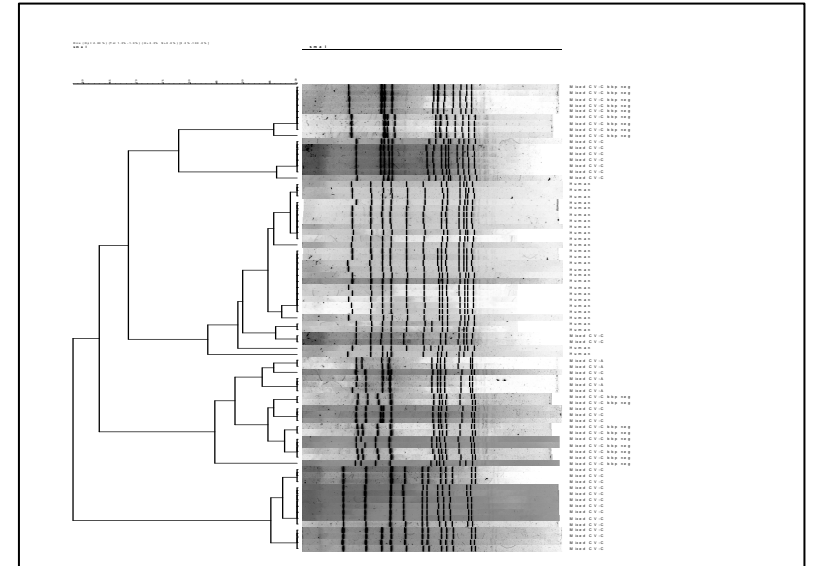
Broth dilution method

3. **Detection of resistance genes** (*vanA*, *vanB*, *mecA*, *tetA*, *tetB*., *tetM* etc..)

# RESEARCH ACTIVITY

## 1. Staphylococcosis

Study of virulence factors, PFGE and analysis of protein A polymorphism of *Staphylococcus aureus* isolates (molecular epidemiology)



## 2. Enteric diseases

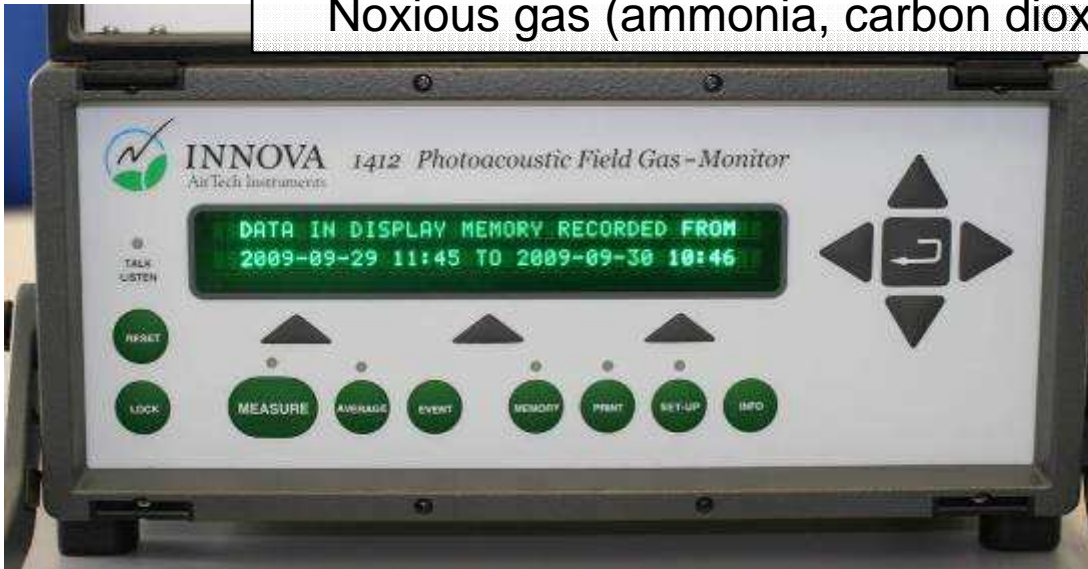
Quali-quantitative study of the rabbit intestinal microbiota through Real-Time PCR



### 3. Animal welfare

Study of environmental parameters in intensive rabbit farms and their effects on animal health and welfare

Noxious gas (ammonia, carbon dioxide, methane, hydrogen sulphide)



Bacteria and fungal spores

### 3. Animal welfare

Study of environmental parameters in intensive rabbit farms and their effects on animal health and welfare



Total dust

#### Microclimatic parameters

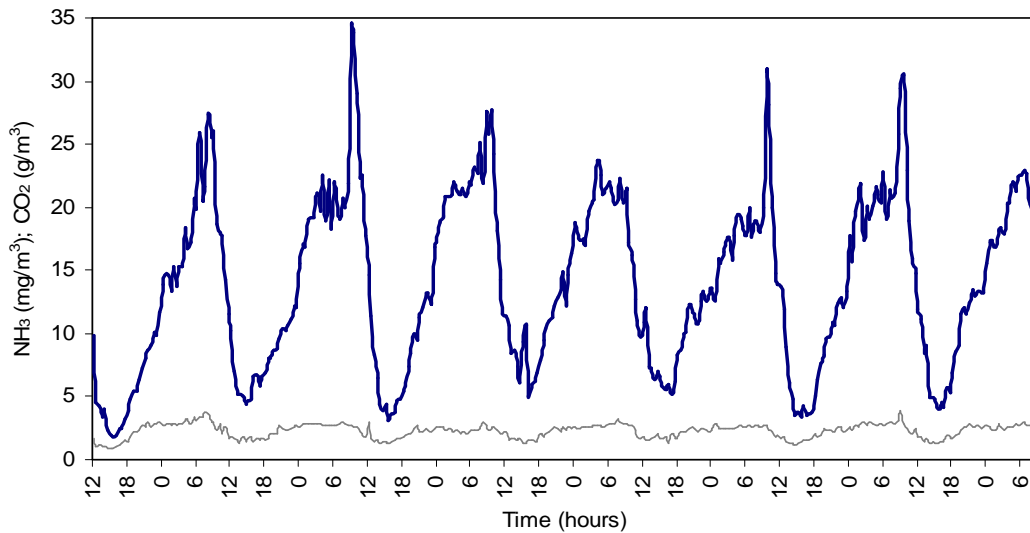
Temperature, relative humidity, air speed





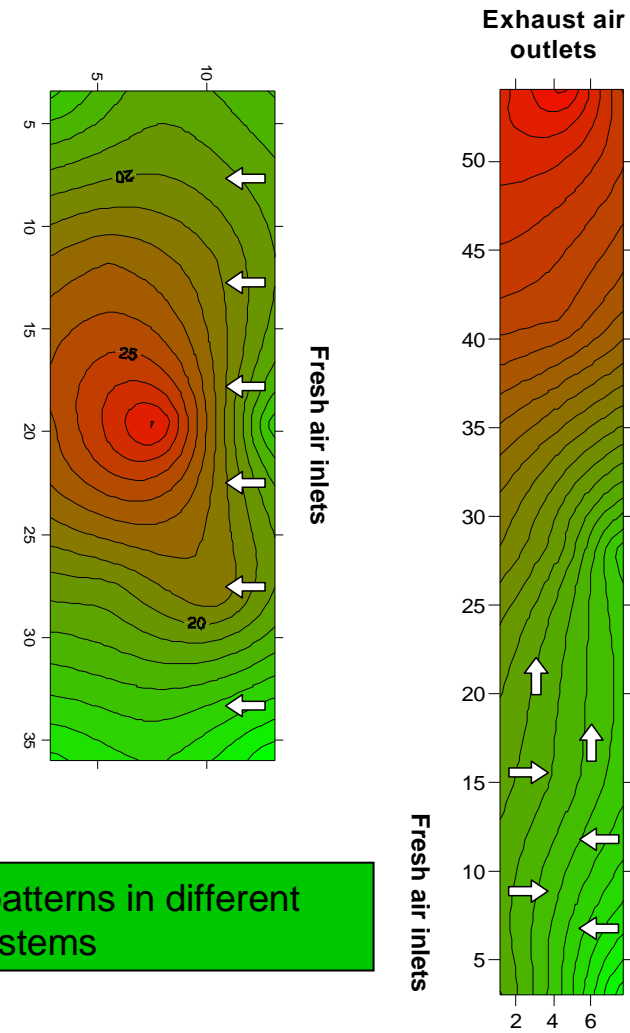
### 3. Animal welfare

## Study of environmental parameters in intensive rabbit farms and their effects on animal health and welfare



Ammonia and carbon dioxide concentration trends over a 7-day period

— Ammonia  
— Carbon dioxide

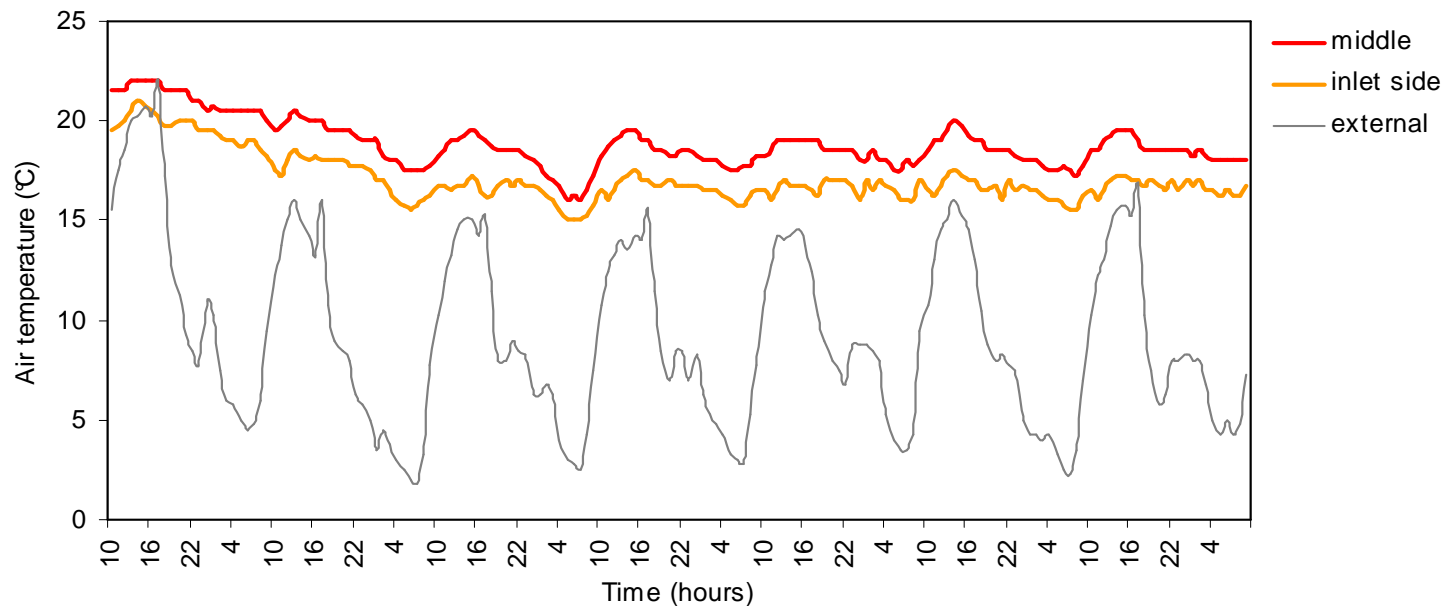


Ammonia concentration patterns in different ventilation systems



### 3. Animal welfare

## Study of environmental parameters in intensive rabbit farms and their effects on animal health and welfare



Air temperature in different points inside a rabbit house compared to external temperature over a 7-days period

## 4. Clostridial enteric diseases

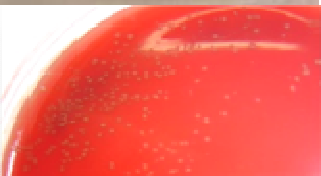
Set up of biomolecular methods  
for the

- detection
- identification
- **characterization** (toxintyping, ribotyping)

of clostridia



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Treviso historic center and the new IZSve laboratory

