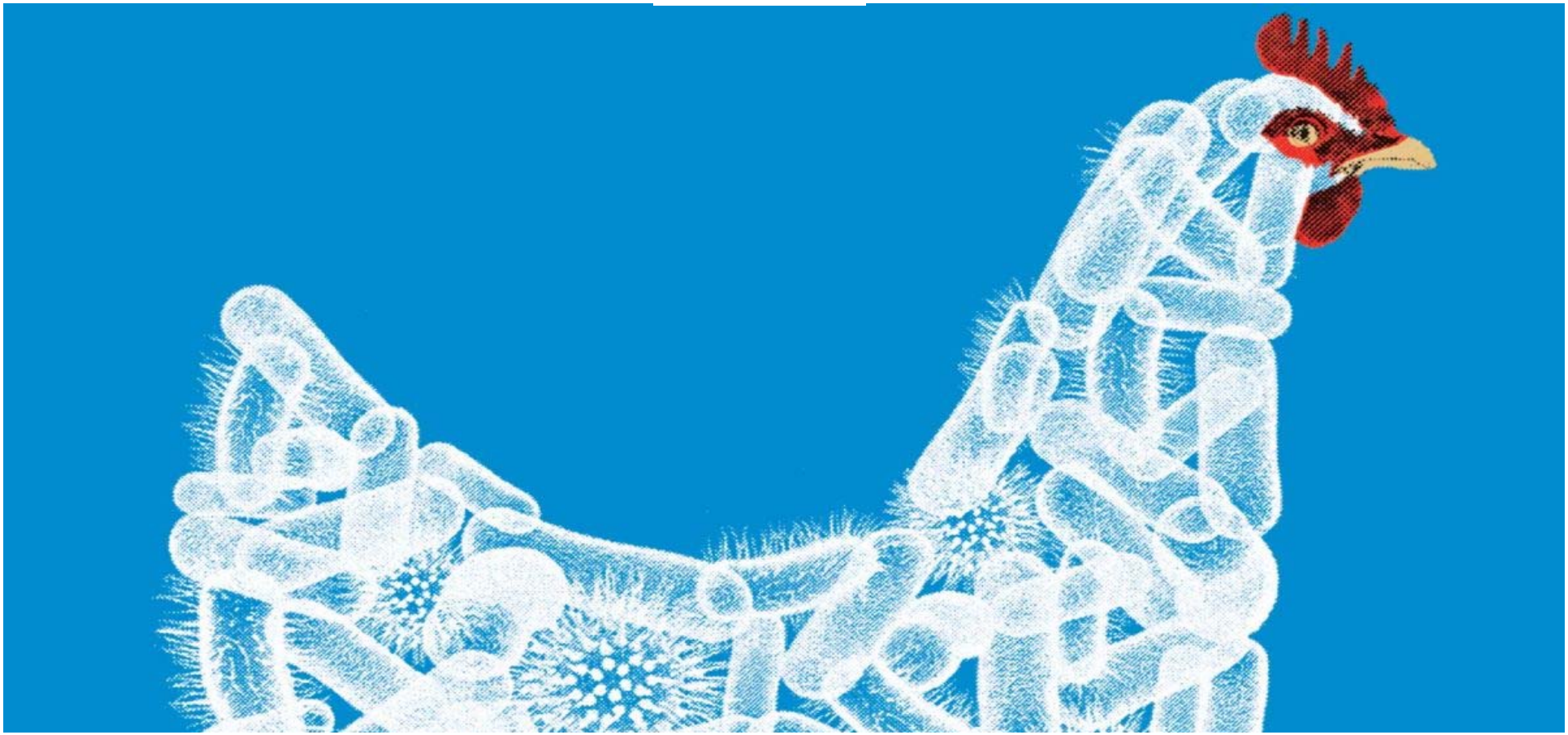
On farm risks associated with the prevalence of resistant strains of *Escherichia coli*: a pilot study

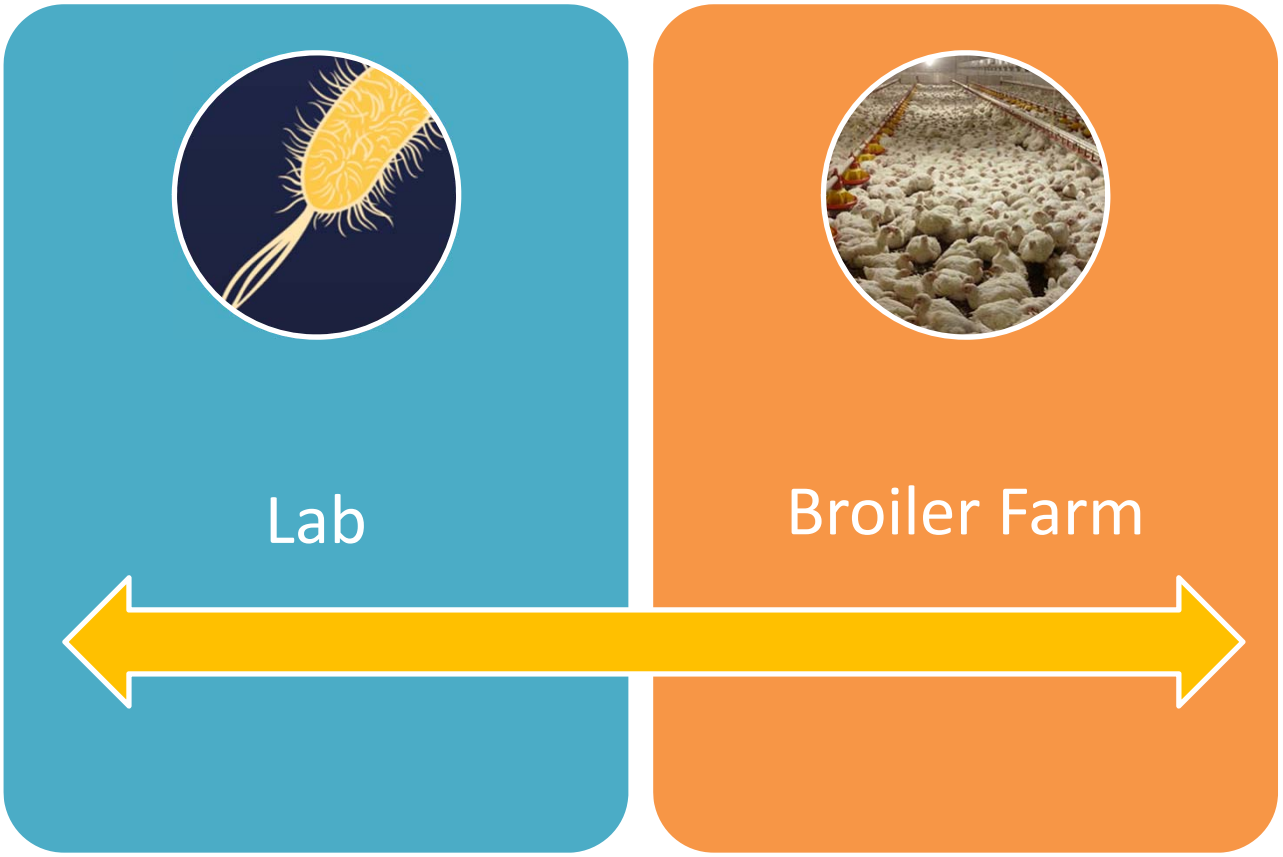
Xexaki A., Sossidou E.N., Filiousis G. , Petridou E.



The aim of the study

Investigate the prevalence of resistant strains

of *Escherichia coli* as related to **on farm risk factors**



Escherichia coli : Resistant strains

Use of antibiotics

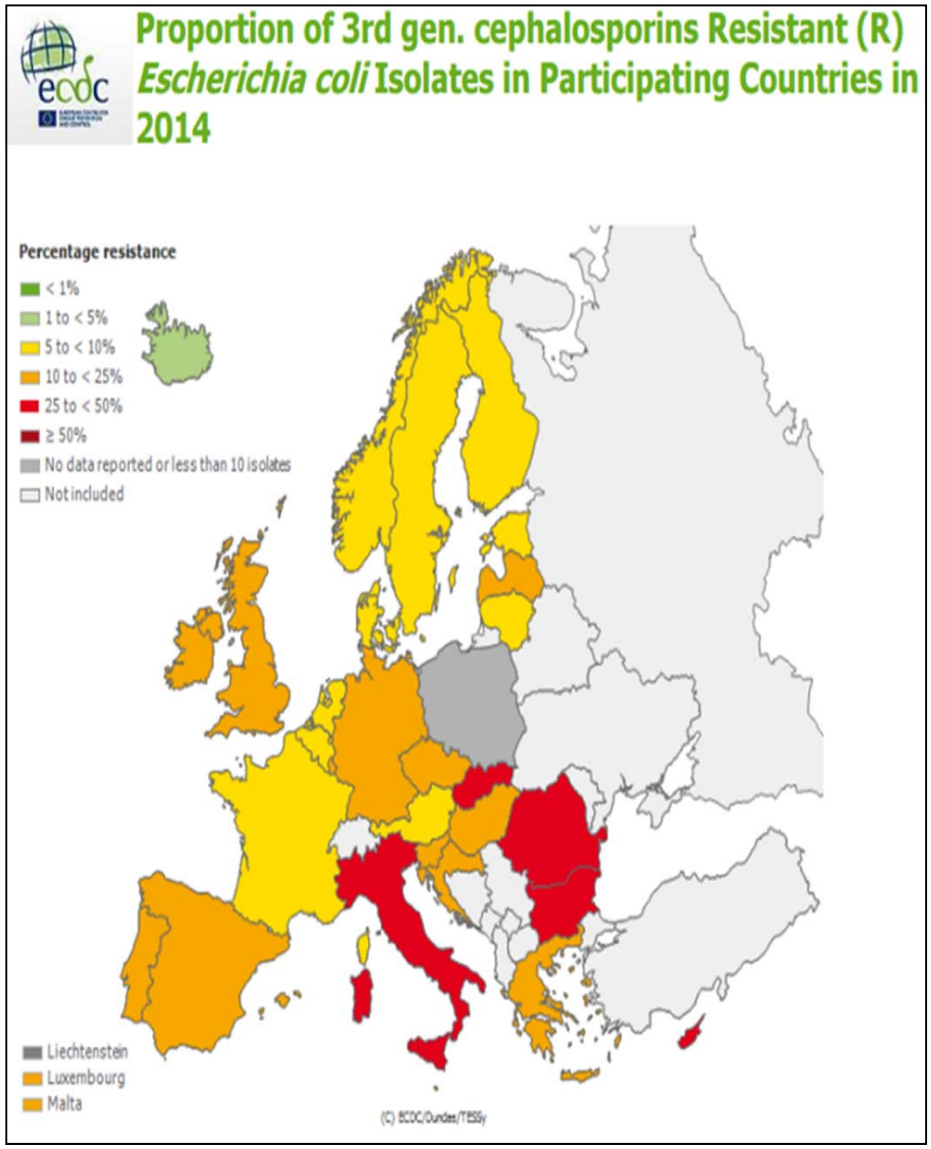
The European Centre for Disease Prevention and Control (ECDC)

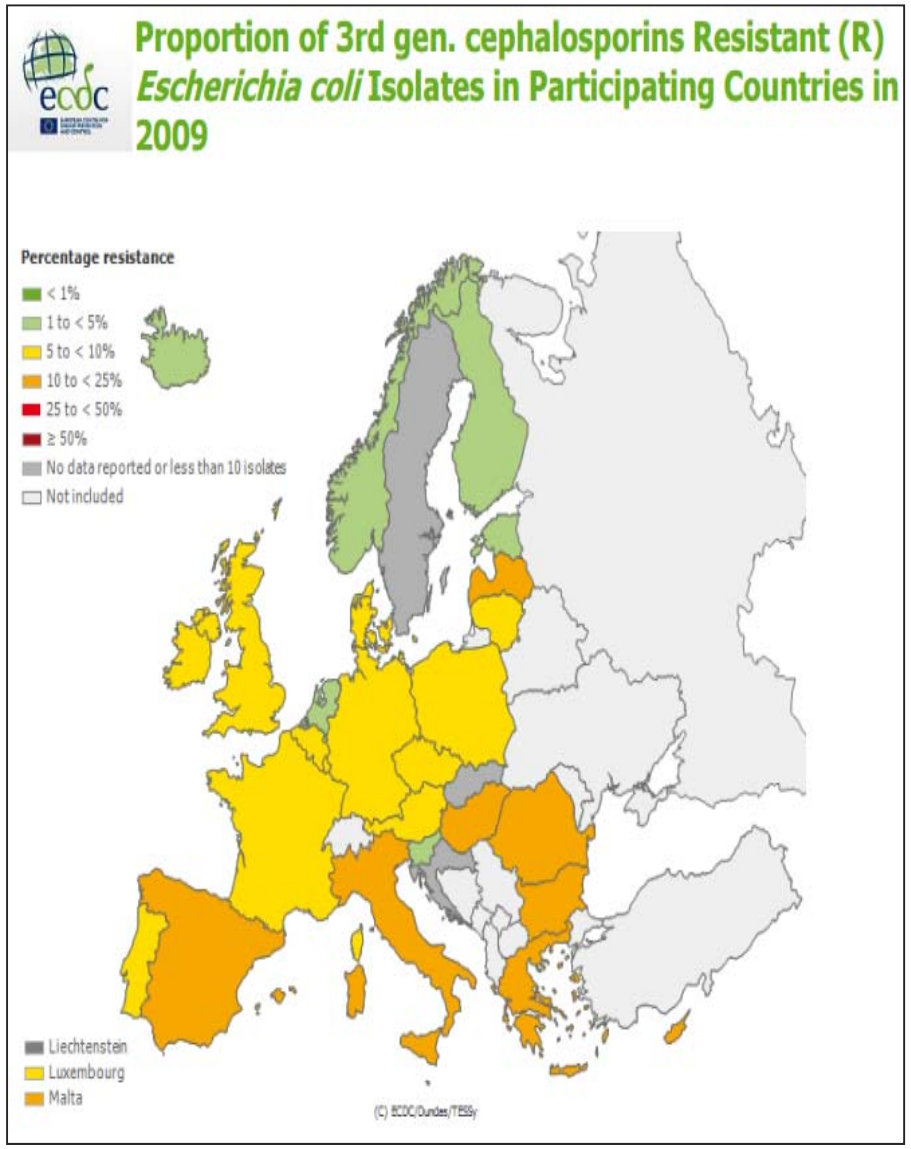
Antimicrobial resistance surveillance in Europe 2014

More than half of the *E. coli* isolates reported to EARS-Net in 2014 were resistant to at least one antimicrobial group under surveillance.

Resistance to aminopenicillins and fluoroquinolones were most commonly reported, both as single resistance and in combinations with other antimicrobial groups.

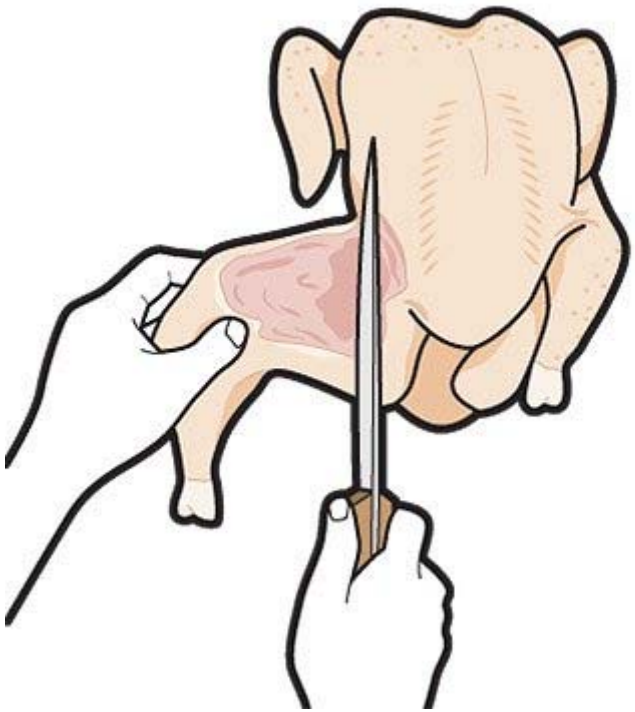
The highest resistance percentages were generally reported from Southern and South-Eastern Europe.


Proportion of 3rd gen. cephalosporins Resistant (R) *Escherichia coli* Isolates in Participating Countries in 2014
Percentage resistance
< 1%
1 to < 5%
5 to < 10%
10 to < 25%
25 to < 50%
≥ 50%
No data reported or less than 10 isolates
Not included
Liechtenstein
Luxembourg
Malta
(C) ECDC/Dundee/TESSy


Proportion of 3rd gen. cephalosporins Resistant (R) *Escherichia coli* Isolates in Participating Countries in 2009
Percentage resistance
< 1%
1 to < 5%
5 to < 10%
10 to < 25%
25 to < 50%
≥ 50%
No data reported or less than 10 isolates
Not included
Liechtenstein
Luxembourg
Malta
(C) ECDC/Dundee/TESSy

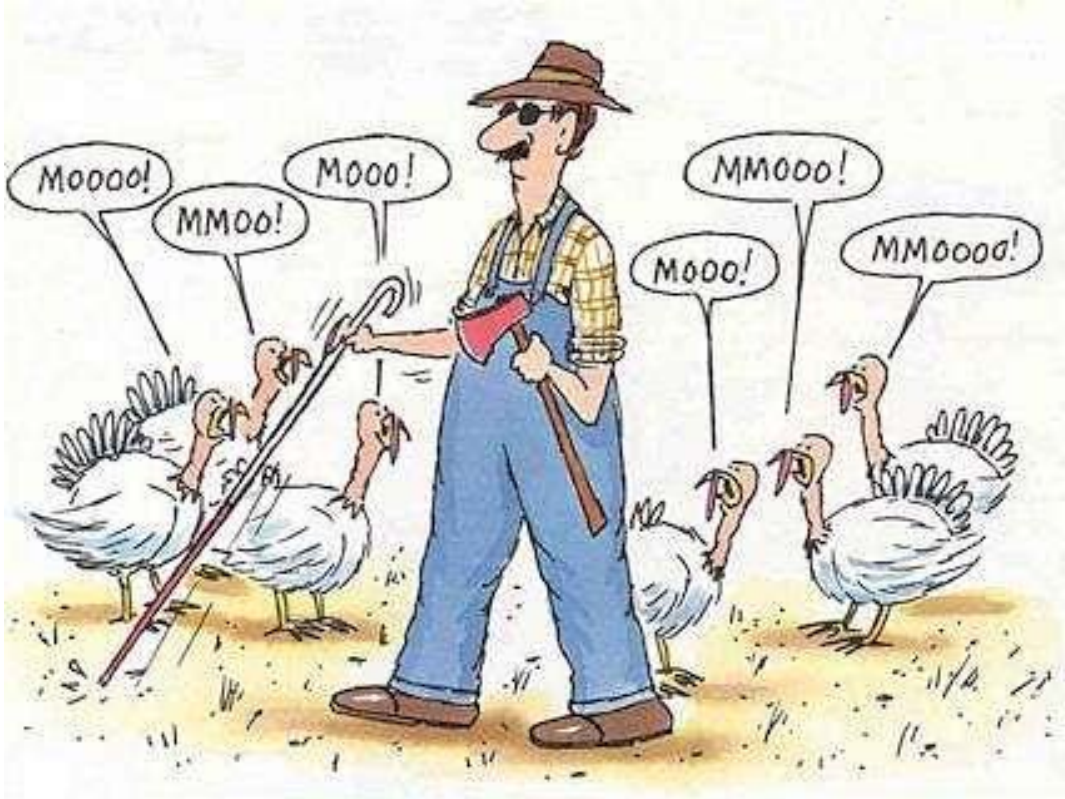
Escherichia coli : Resistant strains

Meat handling

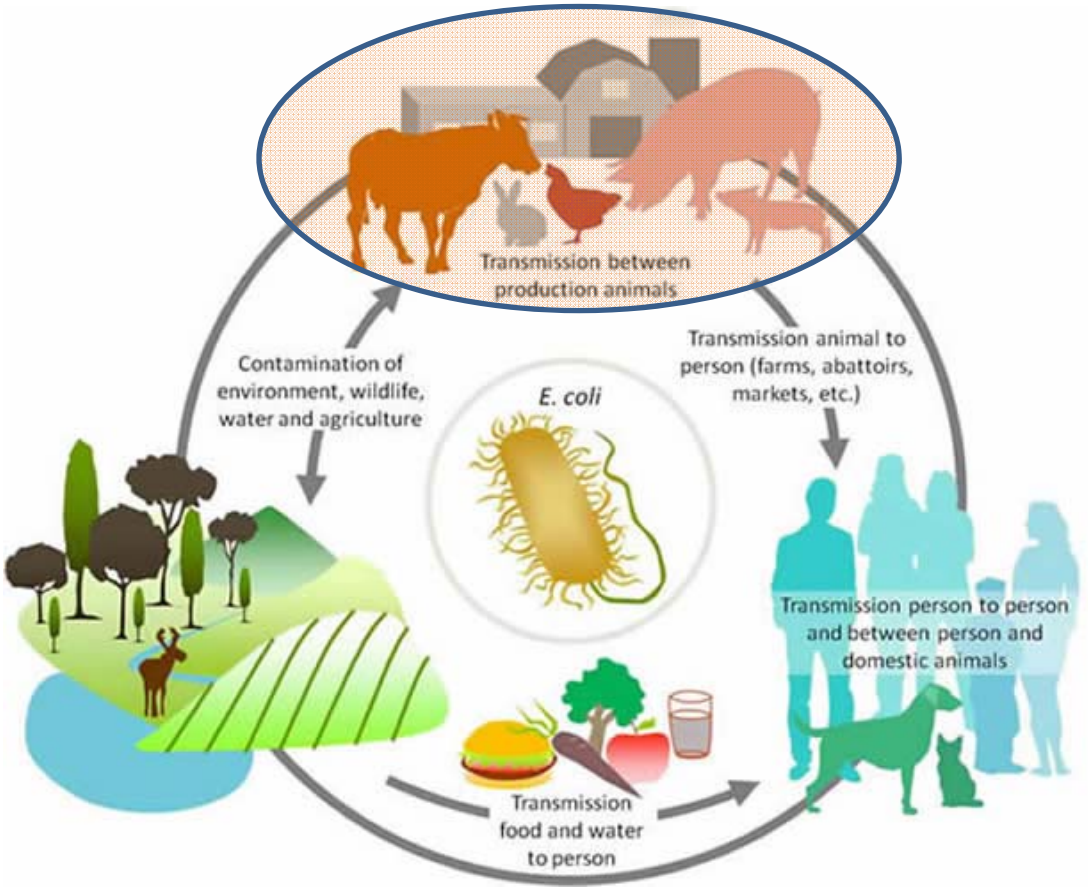


Escherichia coli : Resistant strains

Farmers



Risk factors



To stop emerging and reduce resistance levels

it is first necessary to identify the factors

that influence the presence of this resistance.

at farm level

RISK FACTORS	References
Genotype	Persoons *et al.* 2010
Type of drinkers	Lejeune *et al.* 2001
Insects	Blaak *et al.* 2014
Use of antibiotics	Baron *et al.* 2014, Persoons *et al.* 2010, Liebana *et al.* 2013, Nguyen *et al.* 2015, Baron *et al.* 2014, Blanc *et al.* 2006, Dierikx *et al.* 2010
Drinking water treatment	Liebana *et al.* 2012, Persoons *et al.* 2010
Bedding material	Persoons *et al.* 2010, Matt *et al.* 2013
Age of birds	Chauvin *et al.* 2013
Biosecurity measures	Matt *et al.* 2013, Nguyen *et al.* 2015
Hatchery	Persoons *et al.* 2010, Dierikx *et al.* 2013

Materials and Methods

132 broiler farms randomly selected

- intensive production system
- sited in regions which represent more than 70% of the Greek broiler production

Materials and Methods

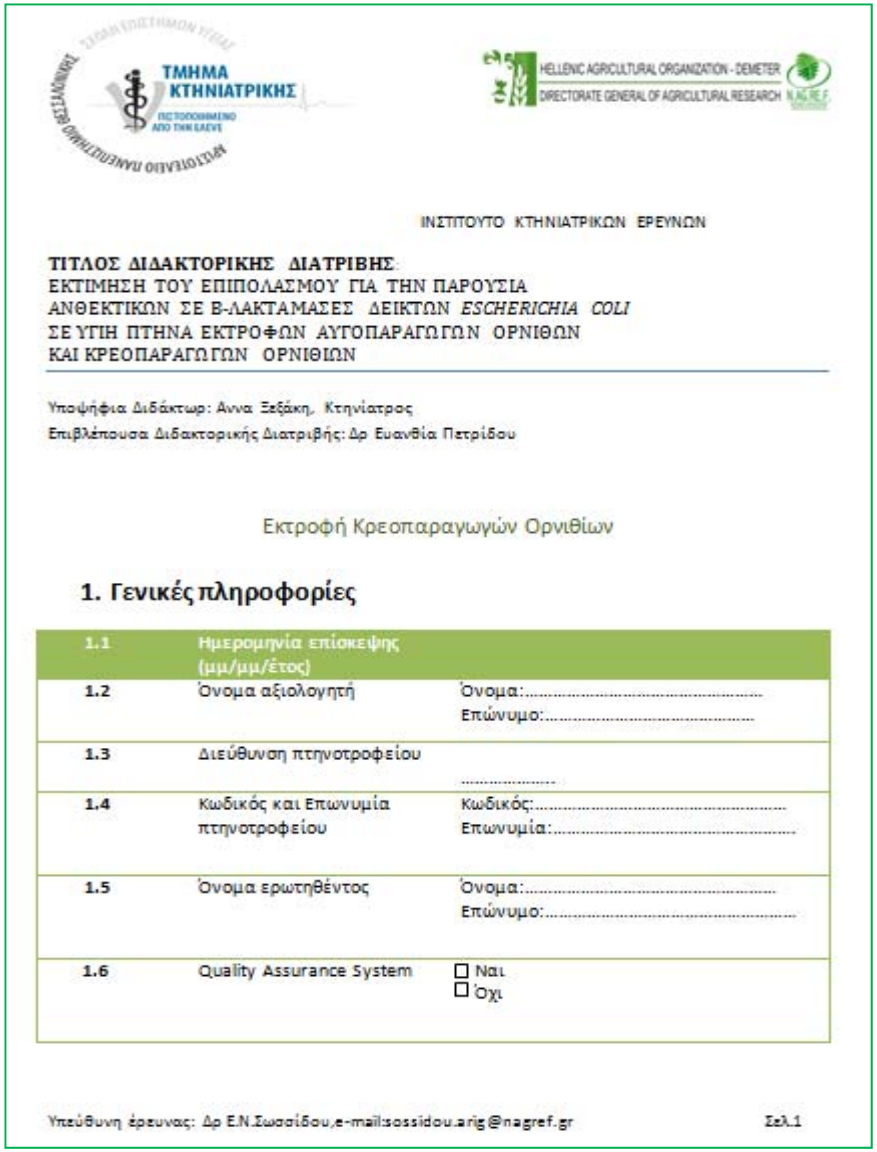
Two samples of fecal swabs were collected from the floor, cultivated in chromogenic agar TBX (Merck) and incubated aerobically for 24h at 44° C

Every sample was tested for 16 antimicrobials using the Kirby-Bauer disk diffusion method

ceftriaxone CRO 30	ceftazidime CAZ 30	cefrodoxime CPD 10	cefotaxime CTX 30
aztreoname ATM 30	ciprofloxacin CIP5	ampicillin AMP 10	piperacillin PIR100
amoxicillin clavulanate AMC 10/20	tetracycline TET 30	doxycycline DOX 30	nalidixic acid NAL 30
gentamycin GMN 10	sulfamethoxazole SSS 300	chloramphenicol CHL 30	streptomycin SMN 100

Materials and Methods

- **Observations and interviews**
- **Questionnaire Sections :**
  - i. General information
  - ii. Information about the flock
  - iii. Managerial practices
  - iv. Cleaning and disinfection
  - v. Biosecurity measures
  - vi. Feeding and watering method
  - vii. Harvesting system
  - viii. Staff
  - ix. Antimicrobial therapy
  - x. Microclimate in the shed
  - xi. General Observations



ΤΜΗΜΑ ΚΤΗΝΙΑΤΡΙΚΗΣ

HELLENIC AGRICULTURAL ORGANIZATION - DEMETER
DIRECTORATE GENERAL OF AGRICULTURAL RESEARCH

ΙΝΣΤΙΤΟΥΤΟ ΚΤΗΝΙΑΤΡΙΚΩΝ ΕΡΕΥΝΩΝ

ΤΙΤΛΟΣ ΔΙΔΑΚΤΟΡΙΚΗΣ ΔΙΑΤΡΙΒΗΣ:
ΕΚΤΙΜΗΣΗ ΤΟΥ ΕΠΙΠΟΛΑΣΜΟΥ ΓΙΑ ΤΗΝ ΠΑΡΟΥΣΙΑ
ΑΝΘΕΚΤΙΚΩΝ ΣΕ Β-ΛΑΚΤΑΜΑΣΕΣ ΔΕΙΚΤΩΝ *ESCHERICHIA COLI*
ΣΕ ΥΓΙΗ ΠΤΗΝΑ ΕΚΤΡΟΦΩΝ ΑΥΓΟΠΑΡΑΓΩΓΩΝ ΟΡΝΙΘΩΝ
ΚΑΙ ΚΡΕΟΠΑΡΑΓΩΓΩΝ ΟΡΝΙΘΙΩΝ

Υποψήφια Διδάκτωρ: Άννα Ξεξάκη, Κτηνίατρος
Επιβλέπουσα Διδακτορικής Διατριβής: Δρ Ευανθία Πετρίδου

Εκτροφή Κρεοπαραγωγών Ορνιθίων

1. Γενικές πληροφορίες

1.1	Ημερομηνία επίσκεψης (μμ/μμ/έτος)	
1.2	Όνομα αξιολογητή	Όνομα:..... Επώνυμο:.....
1.3	Διεύθυνση πτηνοτροφείου	.....
1.4	Κωδικός και Επωνυμία πτηνοτροφείου	Κωδικός:..... Επωνυμία:.....
1.5	Όνομα ερωτηθέντος	Όνομα:..... Επώνυμο:.....
1.6	Quality Assurance System	☐ Ναι ☐ Όχι

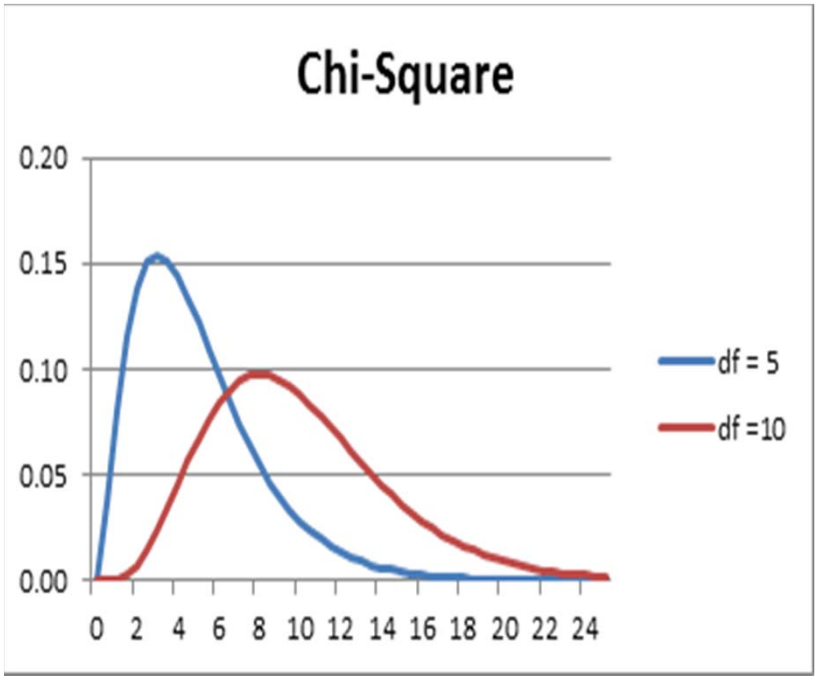
Υπεύθυνη έρευνας: Δρ Ε.Ν.Σωσσίδου,e-mail:sossidou.arig@nagref.gr Σελ.1

Materials and Methods

71 samples were statistically related with **6 risk factors**:
bedding material, season, type of drinkers,
flock genotype, hatchery and site of the farm

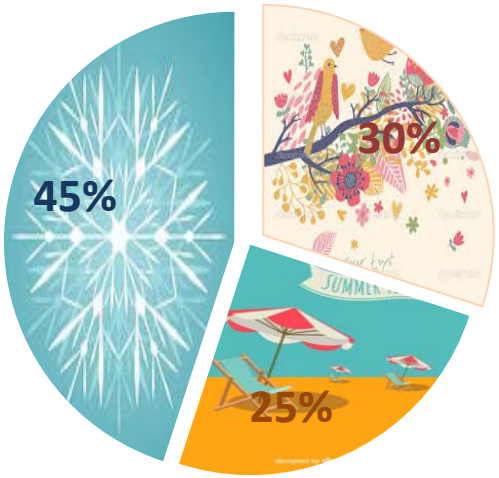
IBM SPSS Statistics Standard Grad Pack Version 22.0

a=0.05



Summary Results

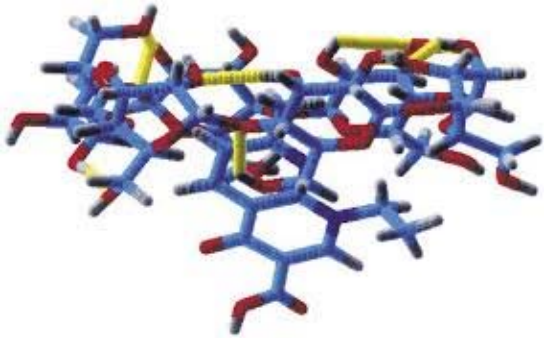
Season of the year



Genotype

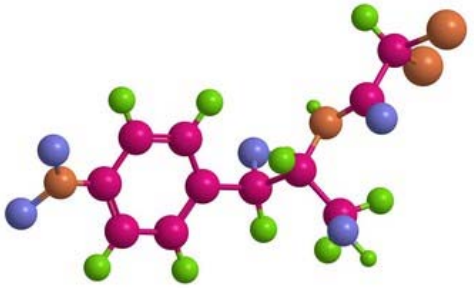
Summary Results

NALIDIXIC ACID			
RISK FACTOR	CATEGORY	FREQUENCY OF OCCURENCE	P value
Type of drinkers	Nipple drinker without tray	18/24	0,030
	Round drinkers, nipple drinkers with tray, combination	11/13	
Season	Spring/summer	13/21	0,049
	Autumn/winter	12/12	
Bedding material	Rice hulls	24/28	0,041
	Straw, soil, wood savings, etc.	6/10	



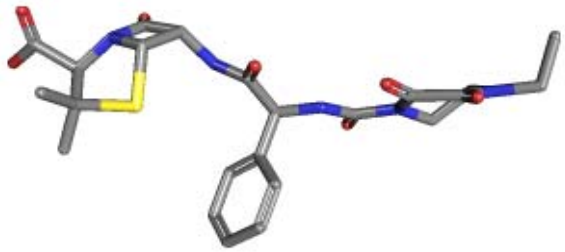
Summary Results

CHLORAMPHENICOL			
RISK FACTOR	CATEGORY	FREQUENCY OF OCCURENCE	P value
Season	Spring/summer	15/21	0,443
	Autumn/winter	10/12	
Hatchery	A	23/36	0,164
	B, C	0/2	
Bedding material	Rice hulls	21/28	0,004
	Straw, soil, wood savings, etc.	2/10	



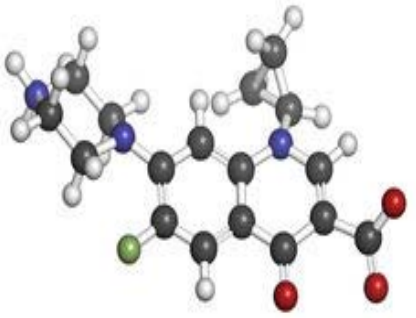
Summary Results

PIPERACILLIN			
RISK FACTOR	CATEGORIES	FREQUENCY OF OCCURENCE	P value
Hatchery	A	24/32	0,056
	B,C	0/1	
Site of the farm	A	29/32	0,038
	B, C, D	4/6	



Summary Results

CIPROFLOXACIN			
RISK FACTOR	CATEGORIES	FREQUENCY OF OCCURENCE	P value
Type of drinkers	Nipple drinker without tray	14/24	0,011
	Round drinkers, nipple drinkers with tray, combination	9/13	
Season	Spring/summer	11/21	0,042
	Autumn/winter	11/12	



Summary Results

GENTAMICIN			
RISK FACTORS	CATEGORIES	FREQUENCY OF OCCURENCE	P value
Season	Spring/summer	8/22	0,031
	Autumn/winter	1/16	
Hatchery	A	6/32	0,050
	B,C	1/1	

Conclusions

The risk for the prevalence of resistant strains of Escherichia coli was significantly (P≤0.05) increased

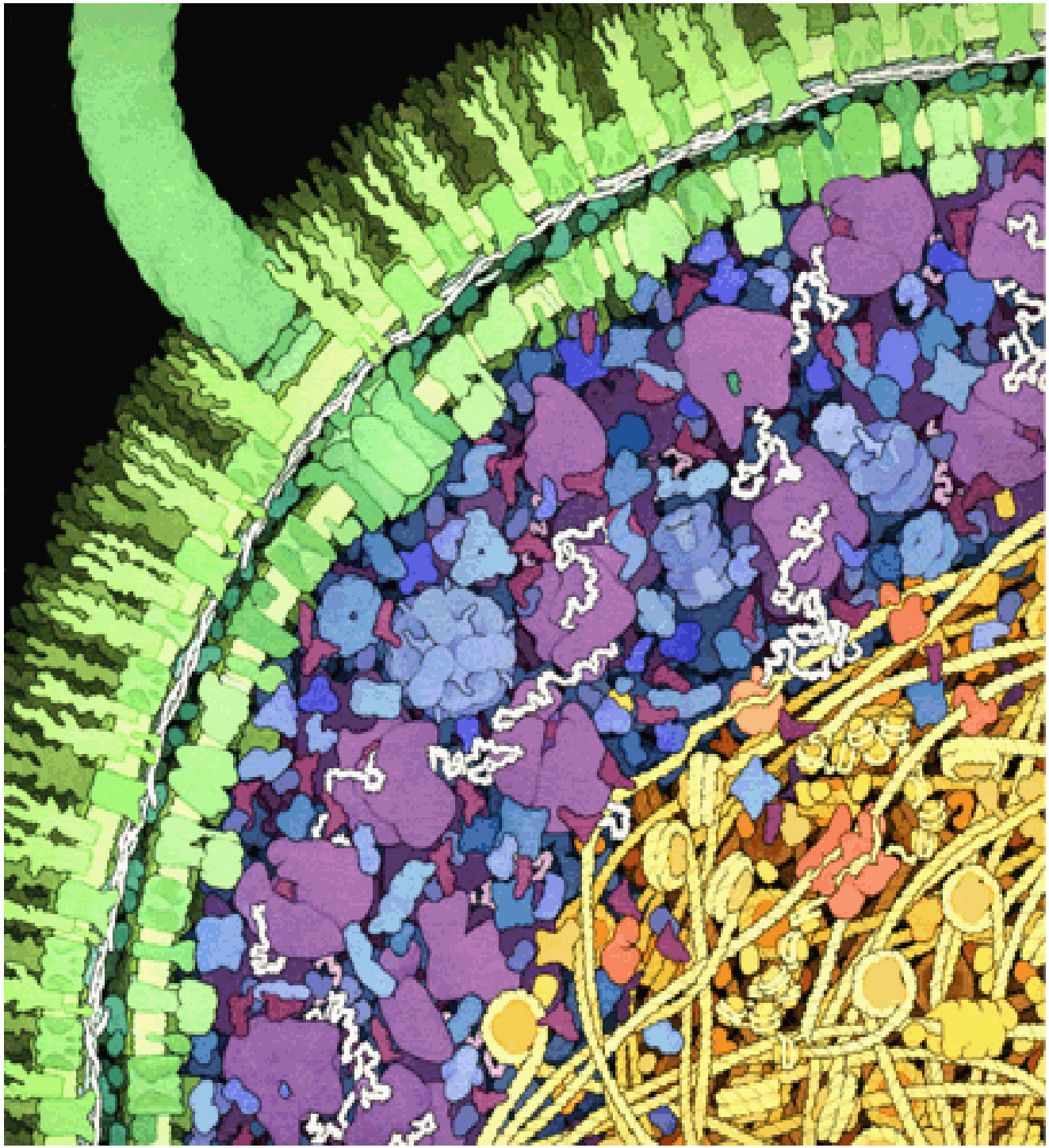
Pilot study
in the framework of a PhD Thesis

TITLE: 'Assessment of the prevalence for the presence of resistant strains *Escherichia coli* producing b-lactamases, in broilers and laying hens'

AIM: Investigate the prevalence of resistant genes among third generation cephalosporin resistant strains of *Escherichia coli* and define on farm risk factors associated with this

Publication:

XEXAKI, A., FILIOUSSIS, G., PAPADOPOULOS, T., SOSSIDOU, E., PETRIDOU, E. (2016) Antibiotic resistance of Escherichia coli isolated from poultry farms in Greece: Preliminary results. European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) 9-12 April 2016, Amsterdam, Netherlands, pp. 181.



Thank you!

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