

*Gıdalardan Gelen Bakteriyel
İnfeksiyonlar:
Enterohemorajik Escherichia coli ve
Salmonella İnfeksiyonları*

Prof.Dr. Muammer Göncüođlu

Ankara Üniversitesi Veteriner Fakóltesi

Gıda Hijyeni Bölümü

Gıda Kaynaklı Enfeksiyonlar Genel bakış



200'den fazla biyolojik, kimyasal ve fiziksel etken



600 milyon hasta –

230 000 ölüm (raporlanabilen –
% 30 çocuk)

Böbrek

Karaciğer

Beyin-nörolojik

Reaktif artrit

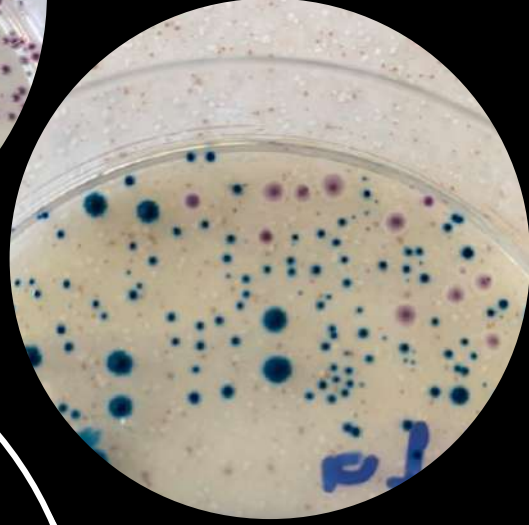
Kanser



Yetersiz beslenme



Kontamine gıda tüketiminden kaynaklanan Engelliliğe
Göre Ayarlanmış Yaşam Yılı (DALY) miktarına katkı –
33 000 000



Patojenler

Antibiyotik direnç

Dezenfektan direnci

Asit direnci

Bağırsak – et –
yum. kanalı
yapışma özellikleri

Virülens faktörler

PATOJENLER - ZOONOZ

Patojenler

Evrim – mutasyon

Emerging
re-emerging

Veri eldesi

Mikroorganizma
mevcut durumu

Çoğalma kinetikleri

Çoğalma – rezervuar – saçılım

Genomik karakterizasyon



Çiftlik neden önemli ?

- Sağlıklı çiftlik ↔ sağlıklı gıda
- Son ürün bazlı yaklaşımlar oldukça eksik (BSE, dioksin)
- Birincil üretim
 - Çevresel faktörler ↔ çevreyi etkileme potansiyeli
- Üretimin azalması
- Ekonomik boyutlar



Çiftlik neden önemli ?

Post-mortem inspeksiyon ve örnekleme programları, garanti veremiyor

Farklı kontaminasyon kaynakları olabilir

Gelişen bilgi ve teknoloji karşısında yasalar yetersiz kalabilir

Uluslar arası standart ve kılavuzlara ihtiyaç duyulmakta

İnsan ve hayvan sağlığı açısından temel prensipler birbirlerine benzer nitelikte...

Hayvan vakaları ?



Güvenli olmayanı gıda zincirine sokma !!!

Hayvanlar genelde rezervuar

Gelişmiş ülkelerde hayvan popülasyonunun % 30'u her yıl

Belirlemesi zor

Sıfır tolerans da zor - engellenebilir

Antibiotic resistance of *Escherichia coli* O157:H7 isolated from cattle and sheep

Muammer Goncuoglu • Fatma Seda Bilir Ormanci •
Naim Deniz Ayaz • Irfan Erol

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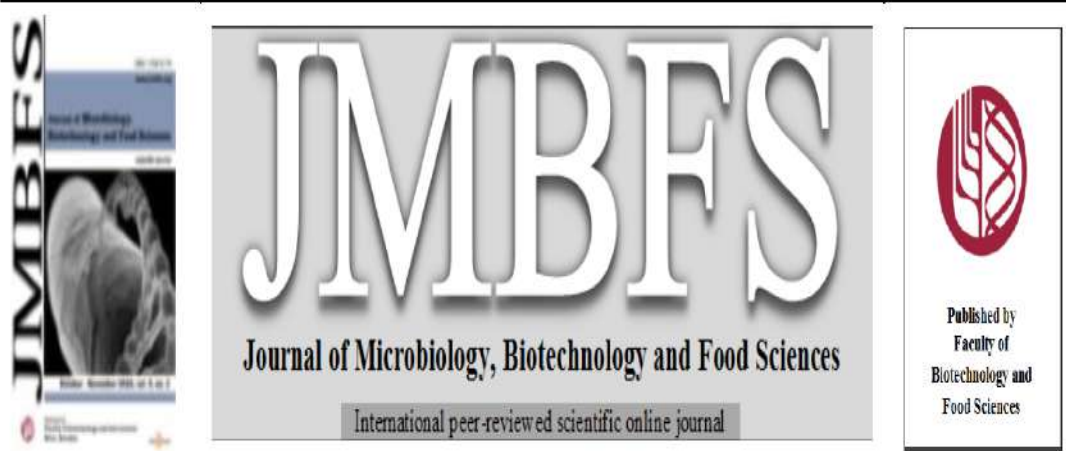
- **102 *E. coli* O157:H7**
 - % 36 sefalotin
 - % 9 streptomisin
 - % 7 sülfanamid bileşikleri
 - **intermediately resistant streptomisin, sefalotin, sulfametak., ampisilin, kanamisin**

Isolation and genomic characterization of *Escherichia coli* O157:H7 in bile of cattle

Muammer Goncuoglu · Irfan Erol · Naim Deniz Ayaz ·
F. Seda Bilir Ormanci · Charles W. Kaspar

Received: 18 January 2010 / Accepted: 19 March 2010 / Published online: 16 April 2010
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- Kesime izin verilen sağlıklı hayvanlardan
- Safra içeriği
- *fliCh7*, *stx1*, *stx2*, *eaeA* ve *hly*
- PFGE – *XbaI* REDP – farklı



COMPARISON OF PREVALENCE AND GENETIC DIVERSITY OF *ESCHERICHIA COLI* O157:H7 IN CATTLE AND SHEEP

Irfan Erol^{*1}, Muammer Goncuoglu², Naim Deniz Ayaç³, Fatma Seda Bilir Ormancı²

- 500 hayvan (282 sığır, 218 koyun)
- Sığır: % 4 – koyun: % 6.4
- *fliCh7*, *stx1*, *stx2*, *eaeA* ve *hly*
- 35 izolatta en az bir antibiyotik direnç geni
- PFGE – *XbaI* REDP – 6 farklı
- Sığır ve koyunlarda farklı PFGE patternleri bulundu!!!!

PREVALENCE AND ANTIBIOTIC RESISTANCE OF *SALMONELLA* SPP. AND *SALMONELLA* TYPHIMURIUM IN BROILER CARCASSES WINGS AND LIVER

MUAMMER GONCUOGLU¹, F. SEDA BILIR ORMANCI, MURAT ULUDAG and GUZIN IPLIKCIOGLU CIL

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FAX: +90-0312-317-00-10;
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doi: 10.1111/jfs.12272

ABSTRACT

The objectives of this study were to isolate and identify *Salmonella* spp. from broiler carcasses, wings and liver samples by immunomagnetic separation based cultivation technique, to verify the isolates as *Salmonella* spp. by the detection of *oriC* gene by PCR, to identify the isolates using malic acid dehydrogenase and DT104 specific primers as *S. Typhimurium* and *S. Typhimurium* DT104. Also to determine the two important virulence genes, virulence plasmid (*spvC*) and invasion (*invA*) for molecular characterization, to evaluate the antibiotic resistance profiles of the isolates. For this purpose, 110 broiler carcasses, 110 broiler wings and 110 broiler liver samples with a total number of 330 were analyzed. Ninety six (29.1%) of the samples were detected as contaminated with *Salmonella* spp. According to the results 11 isolates (11.4%) were identified as *S. Typhimurium*. None of these serotypes were determined as specific phage type DT104. *InvA* gene was detected from all the (100.0%) *Salmonella* isolates and 14 isolates (14.6%) were detected as positive for *spvC* gene. Eighty-three isolates (86.4%) were resistant to at least 5, 70 isolates (72.9 %) resistant to at least 7 and 36 isolates (37.5%) were resistant to at least 9 antibiotic.

PRACTICAL APPLICATION

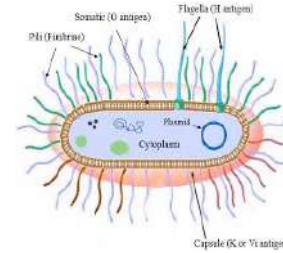
This work is significant because *Salmonella* is still an important public health problem all around the world. This study would provide some data about the incidence of *S. Typhimurium* and *S. Typhimurium* DT104 in chicken meat and parts and the antibiotic resistance of the isolates in Turkey. Besides, the method used in study and the parts chosen for analysis would be a model for the other researchers who are thinking to study in this area.



Tüm *Salmonella* izolatları (96) sulfameth. dirençli - seftiofur ve imipenem duyarlı



83 (86.4%) en az beş antibiyotiğe dirençli,



70 (72.9%) yedi antib.



36 (37.5%) en az dokuz antib.

Kanatlı Hayvanlardan ve Gıdalardan *Salmonella* İzlenmesi ve Kontrol Programlarının Geliştirilmesi

- Program Kodu: TÜBİTAK-1003
- Proje No: 113R036-113R037

- 9295 materyal – 33 farklı serotip
- broyler, **%24,5**
- yumurtacı, %7,4
- hindi, %21,5
- damızlık, %4,2
- Kanatlı kesimhane ve gıdalarına ait 3017 materyalin %39,3 ve **%24,3'ünde** *Salmonella* kontaminasyonu bulundu.

İncelenen Materyaller

	Altlık	Toz	Çevresel	Kemirici	Yem	Su	Toplam
İncelenen örnek	1160	1145	1145	1022	1145	1145	6762
Pozitif örnek*	284	243	240	36	51	15	869
Pozitif %	24,5	21,2	20,9	3,5	4,4	1,3	12,8

Tablo. Broyler kümeslerine ait materyallerden izolasyon oranları.

Serotip	Epidemiyolojik Birim (%)		
	Örnekte	Altlıkta	Toplam izolatlar içindeki oran
Infantis	28,3	17,67	76,5
Kentucky	3,4	2,6	7,3
Enteritidis	2,2	1,5	4
Senftenberg	1,4	0,6	3,3
Mbandaka	0,8	0,4	1,7
Hadar	0,6	0,25	1,2
Typhimurium	0,5	0,25	1
Liverpool	0,34	0,25	0,8
Virchow	0,25	0,25	0,4
II	0,43	0,17	0,4
Corvallis	0,34		0,4
Hindmarch	0,34	0,08	0,4
Anatum	0,17		0,4
Muenchen	0,25		0,3
Othmarchen	0,25	0,17	0,2
Hayindogo	0,17	0,08	0,2
Agona	0,17		0,2
Dublin	0,17	0,08	0,1
Norwich	0,17		0,1
Gaminara	0,17		0,1
Virginia	0,17		0,1
Gamhe	0,17		0,1

Plasmid-Mediated Colistin Resistance in *Escherichia coli* O157:H7 Cattle and Sheep Isolates and Whole-Genome Sequence of a Colistin-Resistant Sorbitol Fermentative *Escherichia coli* O157:H7

Naim Deniz Ayaz , Gizem Cufaoglu, Yesim Yonsul, Muammer Goncuoglu, and Irfan Erol

Published Online: 16 Jul 2019 | <https://doi.org/10.1089/mdr.2019.0053>

- *mcr2* ve *mcr3*
- 128 µg/mL



Pathogen: environmental/food/other sample from Escherichia coli O157:H7

Identifiers BioSample: SAMN10364854; Sample name: Escherichia coli O157:H7 TR01

Organism [Escherichia coli O157:H7](#)
cellular organisms; Bacteria; Proteobacteria; Gammaproteobacteria; Enterobacterales; Enterobacteriaceae; Escherichia; Escherichia coli

Package [Pathogen: environmental/food/other; version 1.0](#)

Attributes

strain	TR01
collected by	Naim Deniz Ayaz
collection date	23-jun-2012
geographic location	Turkey: KIRIKKALE
isolation source	Cattle carcass
latitude and longitude	39.8398 N 33.5089 E
pathotype	Enterohemorrhagic E. coli
serotype	O157:H7

BioProject [PRJNA503568](#) Escherichia coli O157:H7 strain:TR01
Retrieve [all samples](#) from this project

Submission [Faculty of Veterinary Medicine, Ankara University](#), Muammer Goncuoglu; 2018-11-02

Accession: SAMN10364854 ID: 10364854

[BioProject](#) [Nucleotide](#)

Türkiye'de Bazı Bölgelerdeki Sığır ve Koyunlarda Halk Sağlığı Açısından En Önemli Altı Enterohemorajik *Escherichia coli* Serotipinin Varlığının Tespiti, İzolatların Karakterizasyonu ve Serotiplerin İzolasyonuna Yönelik Real-Time PCR Kiti Geliştirilmesi – TÜBİTAK-118R066

6 farklı bölge

720 sığır ve 720 koyun

4320 örnek

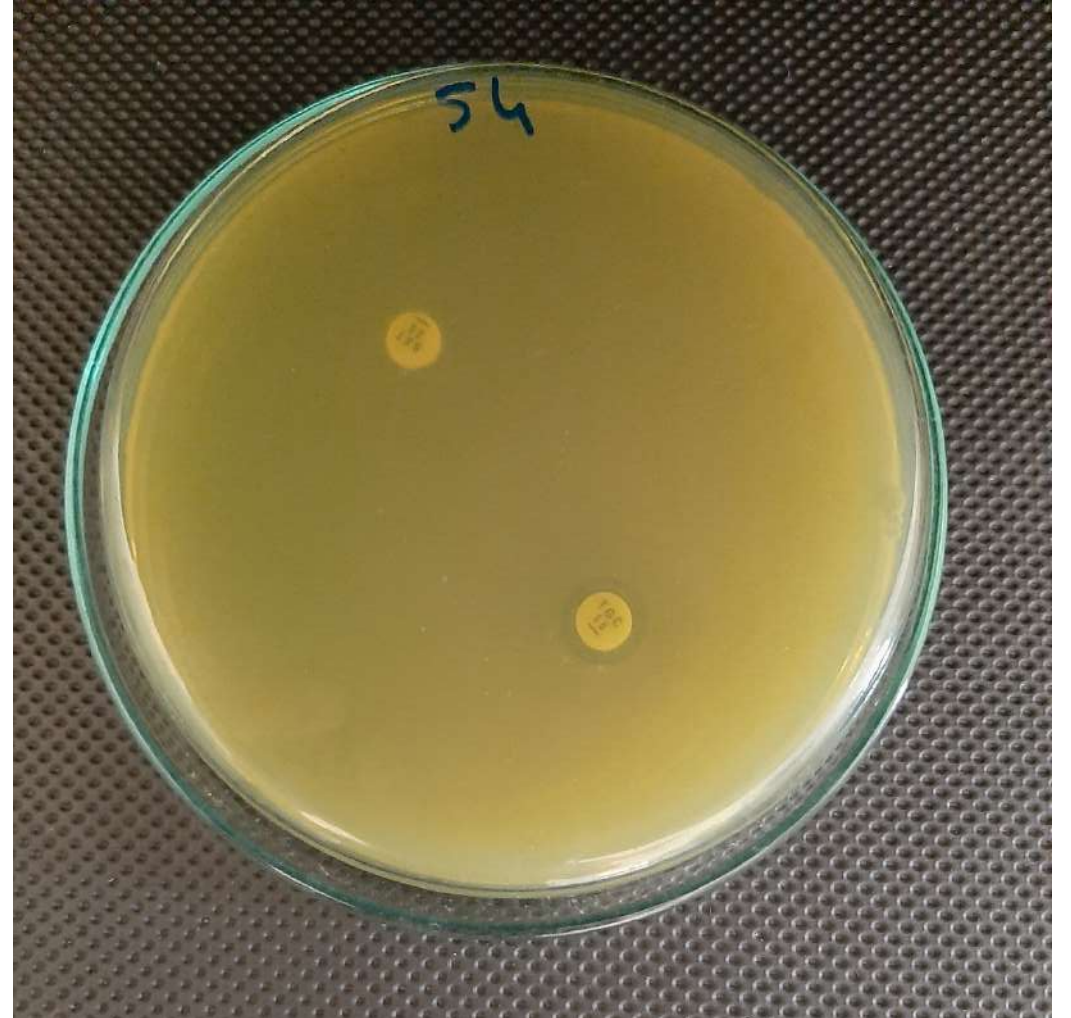
182 EHEC

%91.2 en az bir antibiyotiğe dirençli

16 izolat (%8.7) test edilen tüm antibiyotiklere duyarlı

Üç izolat (%1.6) ise test edilen tüm antibiyotiklere dirençli

O121:H19,
O26:H11, O45:H2



Target gene	Escherichia coli O26 – 78	Escherichia coli O45 – 519	Escherichia coli O121 – 541	Escherichia coli O121 - 556
Stx1	ND*	Positive	Positive	Positive
Stx1a	ND	Positive	Positive	Positive
Stx1b	ND	Positive	Positive	Positive
Stx2	Positive	Positive	Positive	Positive
Stx2a	ND	Positive	Positive	Positive
Stx2b	ND	ND	ND	Positive
Stx2c	ND	Positive	Positive	Positive
Stx2d	ND	Positive	Positive	Positive
Stx2e	ND	ND	ND	ND
Stx2f	ND	ND	ND	ND
Stx2g	ND	Positive	Positive	ND
eaeA	Positive	Positive	ND	ND
eae-α1	Positive	ND	ND	ND
eae-α2	Positive	ND	ND	ND
eae-β	Positive	ND	ND	ND
eae-β1	Positive	ND	ND	ND
eae-β2	Positive	Positive	ND	ND
eae-γ1	Positive	ND	ND	ND
eae-γ2/θ	Positive	ND	ND	ND
Hly	ND	ND	ND	ND
ehxA	ND	Positive	Positive	Positive
katP	ND	ND	ND	ND
subA	ND	ND	ND	ND
Cnf1	ND	ND	ND	ND
Cnf2	ND	ND	ND	ND
toxB	ND	ND	ND	ND
espP	ND	Positive	Positive	Positive
Saa	ND	Positive	Positive	Positive
efa1	ND	ND	ND	ND
Paa	Positive	ND	ND	ND
Gnd	Positive	Positive	Positive	Positive

British girl, 2, dies from E.Coli poisoning after holiday in Turkey



George Martin

Yahoo News UK Oct 8, 2019, 4:31 PM



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Search

Allie Birchall, 2, contracted E.Coli poisoning while on holiday in Turkey. (SWNS)

A two-year-old British girl has died after contracting E.Coli poisoning while on holiday in Turkey.

Allie Birchall came down with the severe illness after returning to the UK following a stay at a luxury resort east of the coastal city of Antalya.

Her family were forced to turn off Allie's life support machine just two weeks after their holiday because of complications caused by the illness.

NFL GAME PASS

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- % 80 MDR
- % 71 nikel
- % 62 çinko
- % 26 QAC
- *blaAmpC*, *ermC*, *murA*, ve *aadA*,
- *rcnA*, *zntA*, *mdfA*, *sugE (c)*, ve *ydg(F)*

- O100:H25 – Enteroagg.

Plazmidler

ant(200)-Ia, *aph(30)-Ia*, *aph(300)-Ib*,
aph(6)-Id, *blaTEM-1A*, *dfrA5*,
mdf(A), *sul1*, *sul2* ve *tet(A)*

Received: 15 February 2022 | Revised: 19 April 2022 | Accepted: 15 May 2022
 DOI: 10.1111/jfs.12995

ORIGINAL ARTICLE

Journal of Food Safety | WILEY

Antibiotic, heavy metal, and disinfectant resistance in chicken, cattle, and sheep origin *E. coli* and whole-genome sequencing analysis of a multidrug-resistant *E. coli* O100:H25 strain

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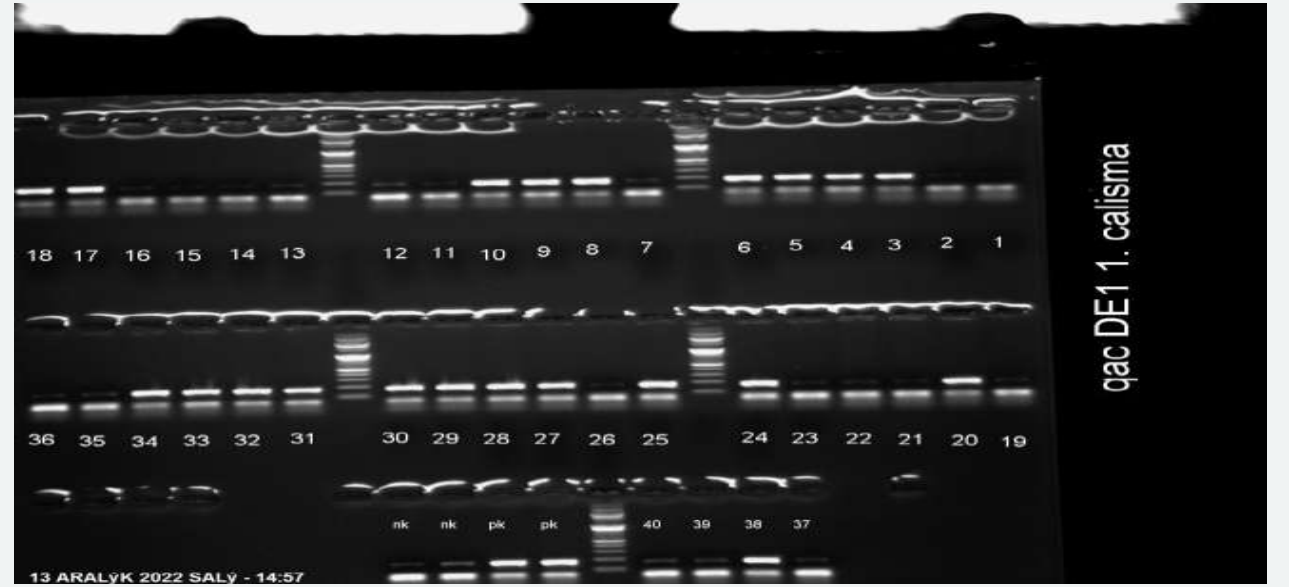
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 Gizem Cufaoglu, Department of Food Hygiene and Technology, Faculty of Veterinary Medicine, Kirikkale University, 71450 Yahsihan, Kirikkale, Turkey.
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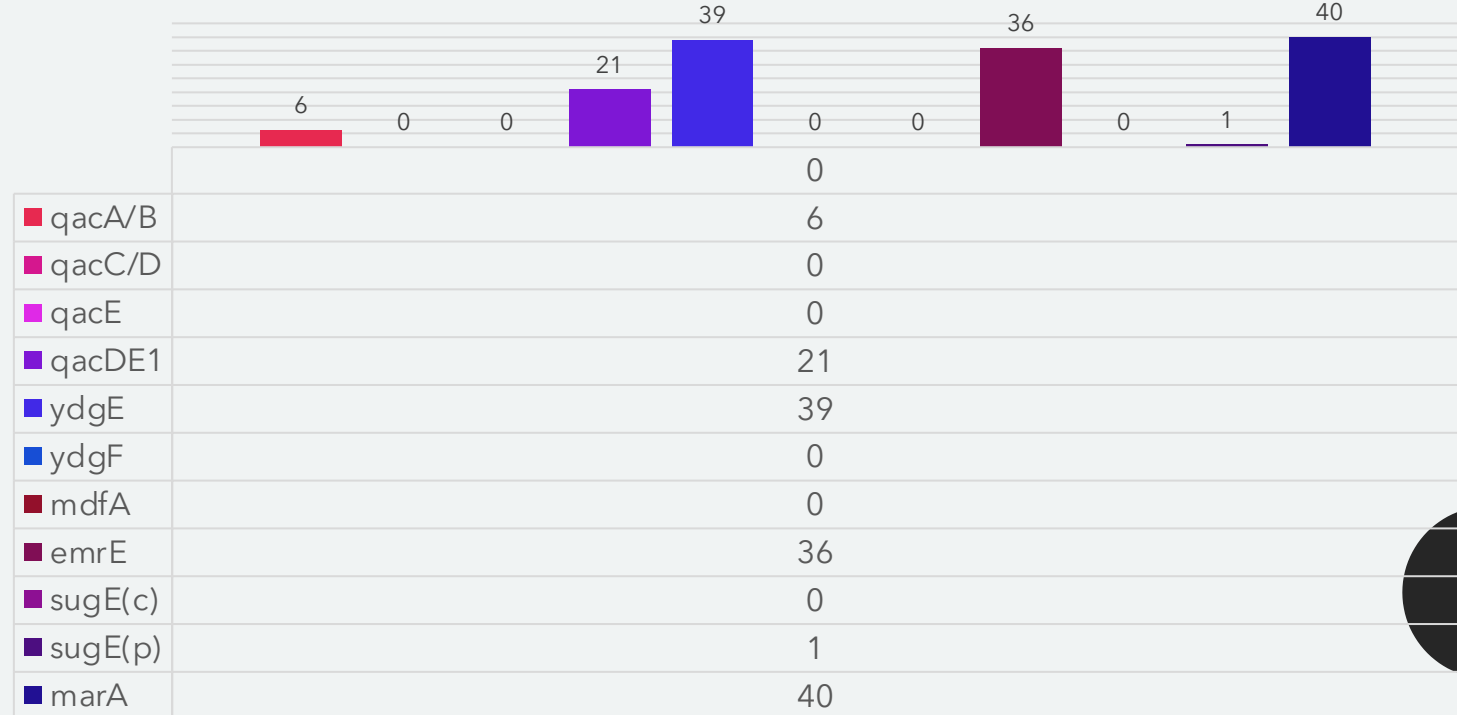
Abstract

In this study, antibiotic, heavy metal, and disinfectant resistance profiles of *E. coli* and *E. coli* O157 isolates were determined, and whole-genome sequencing of a multidrug-resistant *E. coli* O100:H25 strain was reported. A total of 70 *E. coli* isolated from chicken neck skin and sheep cecum samples, and 32 *E. coli* O157 strains isolated from cattle carcass, sheep carcass, and slaughterhouse wastewater samples were explored. Minimum inhibitory concentrations (MICs) of one antibiotics, eight heavy metals, and three disinfectants were determined by the broth microdilution method. Twenty of those isolates exhibiting high MIC values against compounds tested were further analyzed by PCR for the presence of relevant resistance genes ($n = 42$). The majority of the isolates tested were resistant to erythromycin and/or fosfomycin (99% and 78%, respectively) and 89% of the isolates were multidrug-resistant. Among the heavy metals, and disinfectants that were quaternary ammonium compounds (QAC) tested, the highest prevalence of resistance was observed against nickel (71%) and followed by zinc (62%), and N-alkyl-dimethyl-benzyl-ammonium chloride (26%). While *blaAmpC*, *ermC*, *murA*, and *aadA* were the most abundant antibiotic resistance genes, *rcnA* and *zntA*, and *mdfA*, *sugE (c)*, and *ydg(F)* were also commonly observed as heavy metal and disinfectant genes, respectively. Additionally, whole-genome sequencing was performed for a single multidrug-resistant strain (*E. coli* P91). This strain was identified as serotype O100:H25, and harbored three Inc class plasmids and *ant(2'')-Ia*, *aph(3'')-Ia*, *aph(3'')-Ib*, *aph(6)-Id*, *blaTEM-1A*, *dfrA5*, *mdf(A)*, *sul1*, *sul2*, and *tet(A)* genes along with the various heavy metal and disinfectant related genes. The findings of the study show that both phenotypic and genotypic antibiotic, heavy metal, and disinfectant resistance are highly prevalent in *E. coli* isolates that originated from food-producing animals. The use of antimicrobials in food-producing animals needs to be carefully evaluated since the coexistence of antibiotic, heavy metal, and disinfectant resistance genes may result in a coselection that yields the emergence and spread of highly persistent and resistant strains in agricultural settings.

KANATLI KÜMESLERİ VE KESİMHANELERİNDEN ELDE EDİLEN SALMONELLA İZOLATLARINDA BAZI DEZENFEKTAN DİRENÇ GENLERİNİN VARLIĞI VE DEZENFEKTANLARIN İN VİTRO DUYARLILIKLARININ ARAŞTIRILMASI



Örneklerden tespit edilen direnç genlerinin dağılımı

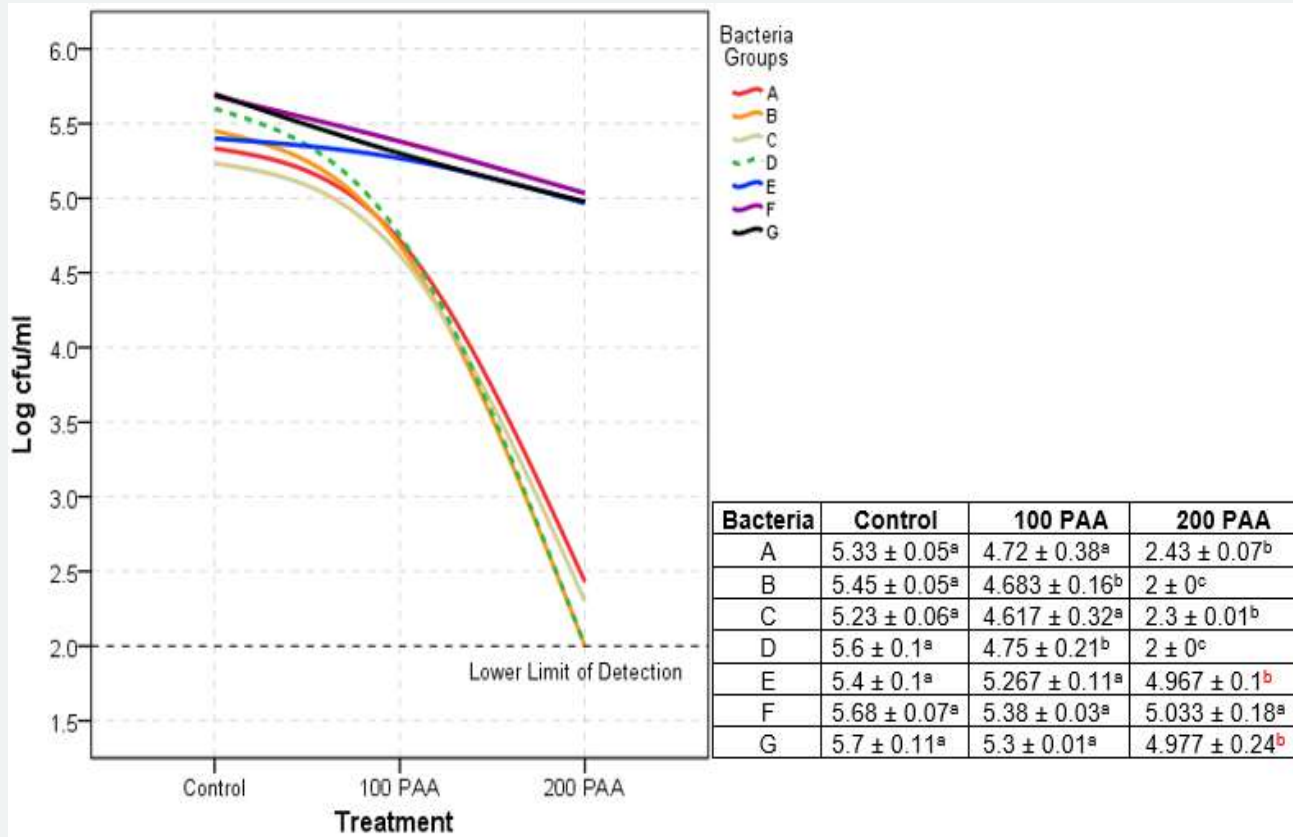


Efficacy of peroxyacetic acid against *Salmonella* biofilms and as a decontaminant agent in poultry meat

ekt.gr alanından [PDF]

Yazarlar Bahar Onaran Acar, Gorkem Cengiz, Erman Gulendag, **Muammer Goncuoglu**, K Serdar Diker

Yayın tarihi 2022/7/10



- **S. Enteritidis**
- **S. Typhimurium**
- **S. Kentucky**
- **S. Infantis**
- **Biyofilm - 4.8 log/ml**
- **Kokteyl - etkisiz**

*Praca oryginalna**Original paper*

Escherichia coli O157:H7 and *Listeria monocytogenes* in raw meatballs and phage control of *L. monocytogenes*

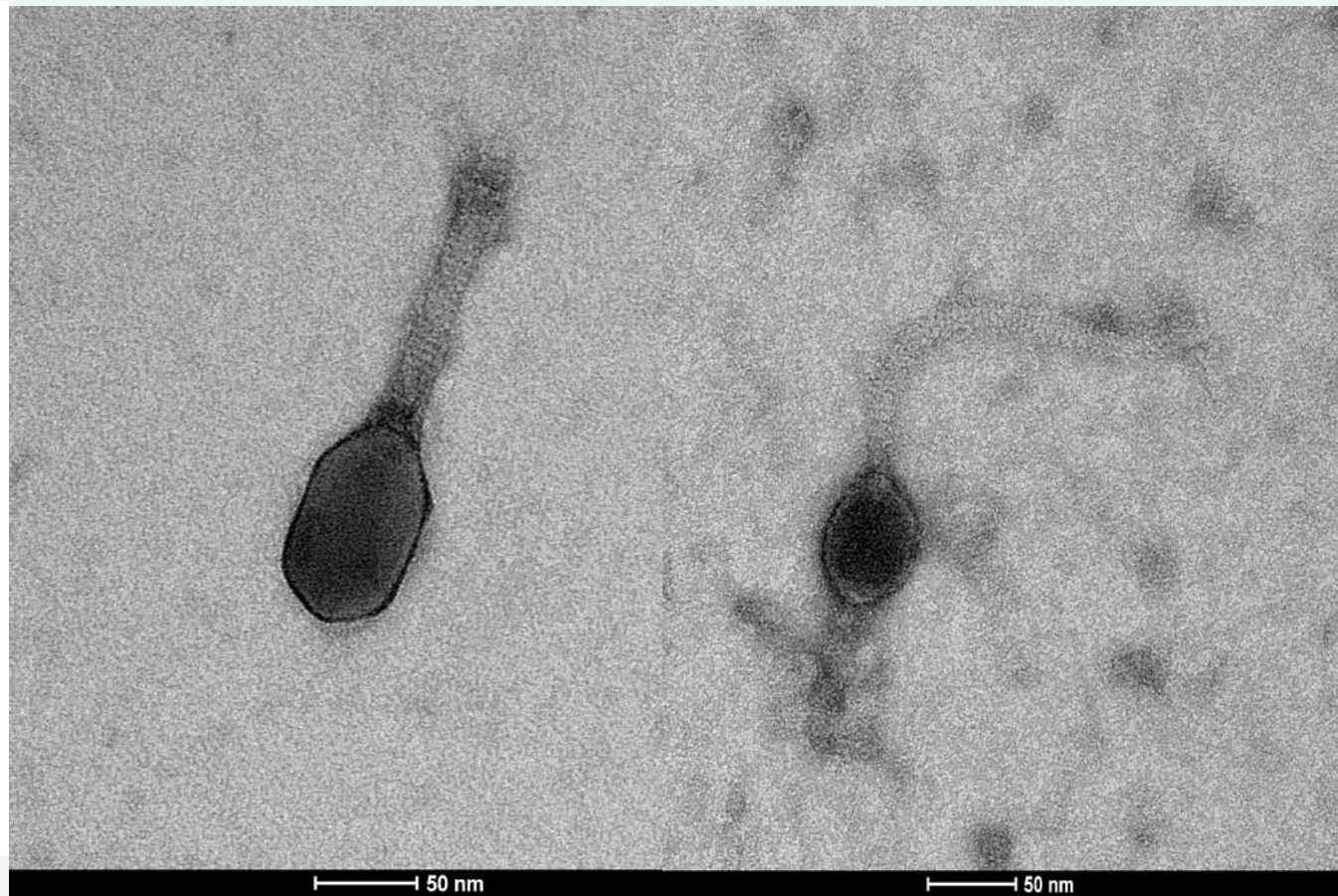
MUAMMER GONCUOGLU – NAIM DENİZ AYAZ – GIZEM CUFAOGLU – GORKEM CENGİZ

Biocontrol of *Escherichia coli* O157:H7 in ready-to-eat salad using a lytic bacteriophage

GİZEM CUFAOGLU, BAHAR ONARAN* NAIM DENİZ AYAZ, MUAMMER GONCUOGLU*, FATMA SEDA ORMANCI*

Initial Mol (log [pfu/cfu])	Initial bacterial count** (log cfu/g)	Test strain	Storage temperature (°C)	Mean reduction (log cfu/g)			
				0.5 h	1 h	3 h	5 h
7.0	2.3	NA-EC43895	4	*	*	0.56	1.23
7.0	2.3	NA-EC43895	10	*	*	0.91	0.38
7.0	2.3	NA-EC43895	22	*	*	1.14	1.05
5.4	3.9	EC12900	4	0.90	0.75	0.65	0.52
5.4	3.9	EC12900	22	1.05	2.02	1.77	1.99
5.0	4.3	NA-EC43895	4	0.60	0.60	1.40	1.38
5.0	4.3	NA-EC43895	10	0.52	0.70	1.45	2.06
5.0	4.3	NA-EC43895	22	1.60	1.57	1.89	2.70
3.4	5.9	EC12900	4	0.30	0.60	0.84	0.81
3.4	5.9	EC12900	22	0.98	2.17	1.70	1.73

Explanations: * under the detection limit of 2.0 log cfu/g; ** initial bacteriophage counts for all phage groups was 9.3 log pfu/g



Biliyoruz - Bilmiyoruz

- İzliyor muyuz?
- Tarıyor muyuz?
- Aynı dönemde çiftlikler?
- Aynı dönemde gıdalar?
- Aynı dönemde insanlar?
- Moleküler-Genomik karakterizasyon?
- Eşgüdüm???



Gelecek ?



İleri teknolojilerin
entegrasyonu



İklim değişikliğine
odaklanmak



Küresel
işbirliği



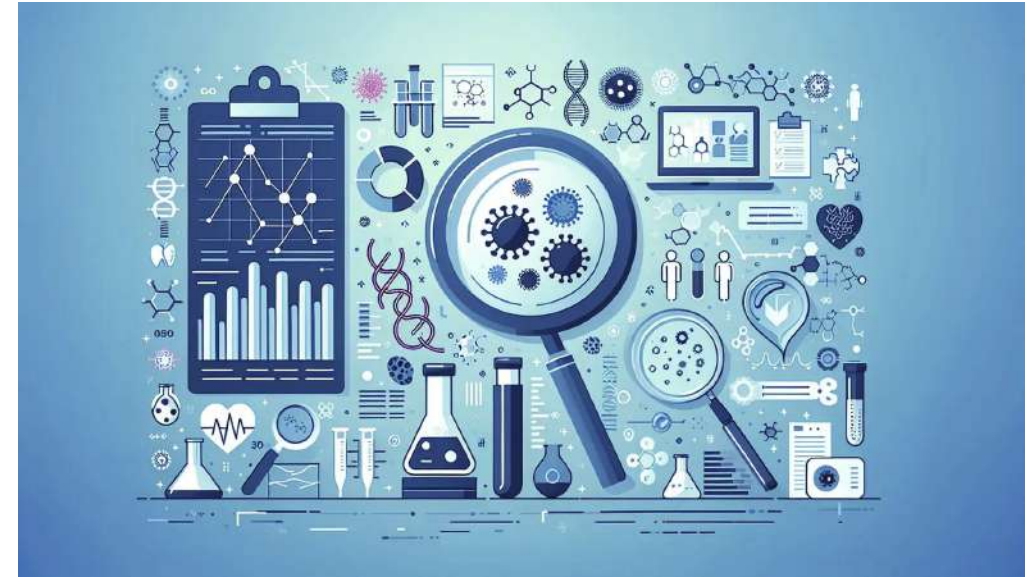
Geleneksel gıda
üretim zincirini
yeniden düşünmek



Kamu bilinci –
mevzuat
değişiklikleri



İnovasyon –
eğitim



Bütünleřtirici Yaklařım

İřbirlięinin g¼c¼

- Altyapı
- Aksiyon alabilme
- Faydaları
- Zorluklar

Disiplinler arası köprü

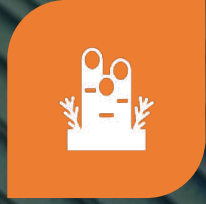
- Altyapı
- Vaka çalıřmaları
- Entegrasyon
- Gelecek kurgusu



Neler Yapabiliriz ?



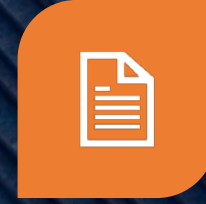
VERİNİN ELDE
EDİLMESİ



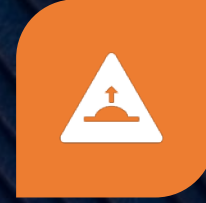
SPESİFİK MO
(PATOJEN-KONAK)



SPESİFİK GIDA-
1. ÜRETİM İLE
BERABER



ÖRNEK TOPLAMA



METOD
(HIZLI-STANDART)



KOORDİNASYON
TRANSPORT



MODELLEME
(İSTATİSTİK)



Muammer.Goncuoglu@veterinary.ankara.edu.tr