

## 식품, 식육의 안전성과 양돈 현장의 대책



김현일 대표  
(주)폴티팜

### 주요내용

- I. 최근 축산물 안전 관련 이슈    II. 점점 더 중요시되는 식육 위생
- III. 우리나라의 현실은?            IV. 항생제 내성 문제

### 1. 최근 축산물 안전 관련 이슈

〈2017.08.15〉

#### ■ 경과

- 2016년 11월 : 네덜란드 Food Safety Agency가 처음으로 Fipronil 오염 감지(finds no danger to public health)
- 2017년 1월 : 벨기에 회사 Poultry Vision이 닭이 구제를 위해 fipronil이 들어 있는 세제 사용
- 2017년 6월 : 벨기에 Food safety authority 네덜란드산 계란에서 "light contamination" 확인
- 2017년 7월 : 네덜란드에 통보했으나 회신이 없자 EU에 도움 요청 / Dega16이 7개 국가 (나중에 17개 국가)에 사용중인 것 확인
- 2017년 8월 : 네덜란드 경찰 Chickfriend 관계자 구속

## ■ EU 8개국 오염 계란 유통



## ■ 중요한 포인트

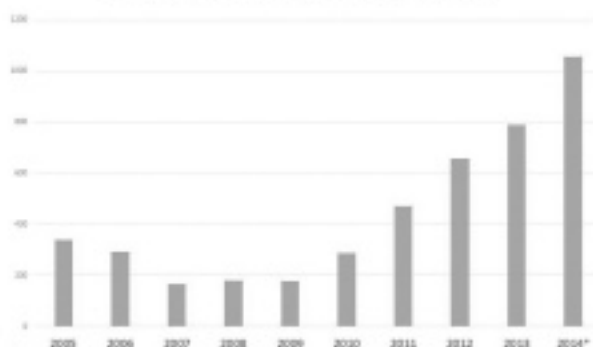
- 왜 fipronil은 산란계 사용이 금지되어 있을까?
- 왜 fipronil을 산란계에서 쓰게 됐을까?
- Fipronil의 대안은?

〈2017.08.25〉



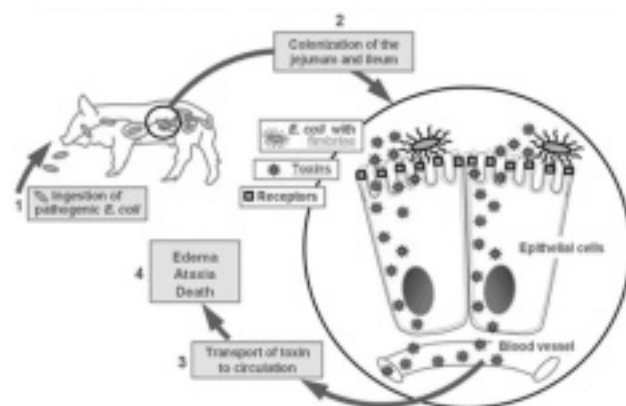
영국에 있는 TESCO 매장 사진. 미국의 월마트, 프랑스의 까르푸와 더불어서 영국의 대표 할인 매장으로 잘 알려져 있다. 최근 감염된 영국 내 환자들의 쇼핑 데이터를 분석해본 결과 공통적으로 TESCO에서 쇼핑을 한 사실이 확인되었고 더 정밀하게 분석해 보니 TESCO 자체 브랜드의 소시지를 소비했다고 발표했다.

Hepatitis E cases in Human (UK)

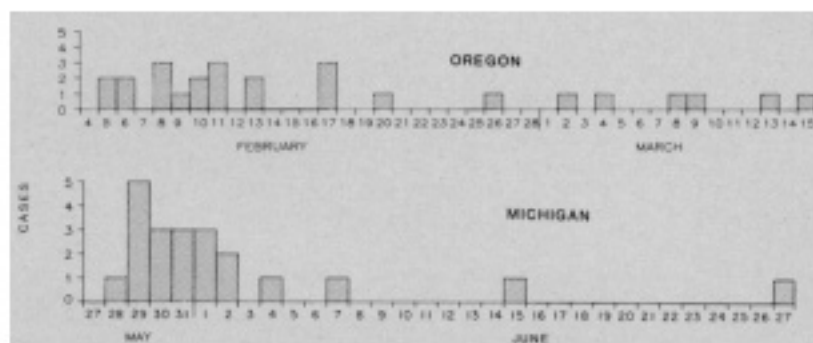


(2017.09.07)

## ■ 맥도널드 조주연 대표 공식사와

■ 햄버거를 먹고 설사 및 복통  
(2016년 9월 25일)

햄버거 패티에 들어있던 세균이 증상을 나타내기 위해서는 일단 사람의 장관 내에 자리를 잡은 다음 독소를 생성해야 한다. 그래서 햄버거를 먹은 지 2시간만에 증상이 나타나기 어렵다는 의견이 많은 것이고, 햄버거를 먹은 지 2시간만에 증상이 나오려면 해당 패티가 아주 많은 세균에 오염이 되어 있어야 하는데, 이 경우 한 명에서만 발생하기 어렵다는 점도 지적되고 있다.



1982년 미국에서 발병한 장출혈성대장균증. 오레건주의 경우 1982년 2월부터, 미시간주의 경우 1982년 5월부터 발생하였다. 전체 43개 케이스에 대해서 역학조사를 해보니 상당수가 맥도널드 햄버거 섭취와 관련이 있었다(Riley, Remis et al, 1983).

## 2. 점점 더 중요시되는 식육 위생

### 인수공통전염병 케이스(영국)

|                               | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014* |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Campylobacteriosis            | 52212 | 52679 | 58140 | 55787 | 65211 | 70371 | 72821 | 72629 | 66575 | 70553 |
| Salmonellosis (non-typhoidal) | 13708 | 14084 | 13279 | 11517 | 10486 | 9692  | 9395  | 8792  | 8461  | 9121  |
| Cryptosporidiosis             | 5413  | 4728  | 3668  | 4937  | 5647  | 4604  | 3573  | 6655  | 4111  | 4597  |
| VTEC O157                     | 958   | 1286  | 1120  | 1247  | 1315  | 1052  | 1484  | 1260  | 1015  | 1185  |
| Hepatitis E                   | 339   | 292   | 166   | 180   | 178   | 287   | 472   | 657   | 788   | 1054  |
| Lyme disease                  | 693   | 940   | 1027  | 1098  | 1093  | 1213  | 1189  | 1249  | 1060  | 955   |
| Pasteurellosis                | 425   | 490   | 457   | 497   | 559   | 586   | 668   | 666   | 717   | 776   |
| Toxoplasmosis                 | 114   | 123   | 146   | 457   | 494   | 414   | 364   | 328   | 325   | 370   |
| Non-O157 VTEC                 | 11    | 20    | 25    | 36    | 45    | 44    | 37    | 59    | 100   | 305   |
| Listeriosis                   | 223   | 208   | 254   | 207   | 234   | 179   | 165   | 185   | 178   | 188   |
| Leptospirosis                 | 60    | 50    | 81    | 76    | 56    | 42    | 52    | 78    | 50    | 78    |
| Taeniasis                     | 76    | 89    | 101   | 100   | 72    | 114   | 94    | 70    | 79    | 70    |
| Yersiniosis                   | 76    | 62    | 78    | 62    | 62    | 54    | 55    | 55    | 60    | 65    |
| Q fever                       | 61    | 200   | 71    | 68    | 31    | 55    | 114   | 126   | 47    | 61    |
| Mycobacterium bovis           | 26    | 29    | 24    | 23    | 29    | 36    | 39    | 39    | 30    | 39    |
| Psittacosis                   | 61    | 30    | 39    | 63    | 60    | 58    | 41    | 57    | 30    | 32    |
| Hydatid disease               | 11    | 14    | 10    | 18    | 9     | 7     | 15    | 6     | 13    | 16    |
| Brucellosis                   | 12    | 16    | 15    | 15    | 18    | 12    | 25    | 14    | 14    | 11    |
| Hantavirus                    | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 4     | 5     |
| Toxocariasis                  | 5     | 2     | 1     | 2     | 4     | 12    | 4     | 7     | 3     | 5     |
| Streptococcus suis            | 3     | 4     | 2     | 7     | 2     | 4     | 1     | 3     | 3     | 3     |
| Anthrax                       | 0     | 1     | 0     | 1     | 13    | 39    | 0     | 5     | 2     | 2     |
| Trichinellosis                | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     |
| Avian influenza               | 0     | 1     | 4     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Rabies 'classical'            | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     |
| Rabies EBLV                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| vCJD15†                       | 5     | 5     | 5     | 2     | 3     | 3     | 5     | 0     | 1     | 0     |

### WHO 인수공통전염병(200가지 이상)

World Health Organization

Health topics | Data | Media centre | Publications | Countries | Programmes | Governance | About WHO

**Zoonoses Diseases**

There are over 280 zoonotic diseases. The major zoonotic diseases WHO deals with are listed below. You will find an introduction to the disease and links to related information on the internet.

List of diseases

- Anthrax
- Avian influenza
- Bovine Spongiform Encephalopathy (BSE)
- Foodborne zoonoses
- Haemorrhagic fevers
- Leptospirosis
- Prion diseases
- Tuberculosis
- Variant Creutzfeldt-Jakob disease (vCJD)

Global Early Warning System for Major Animal Diseases, including Zoonoses (GLEWS)

Collaborating animal health organizations

World Organisation for Animal Health (OIE)

Food and Agriculture Organization of the United Nations (FAO)

## OIE 홈페이지

## 미국 CFSPH 홈페이지(67)

## 영국 정부가 관리하는 인수공통전염병(43)

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[Home](#) > [List of zoonotic diseases](#)

 Public Health England

**Guidance**  
**List of zoonotic diseases**  
Published 21 March 2013

| Disease             | Main reservoir                       | Usual mode of transmission to humans |
|---------------------|--------------------------------------|--------------------------------------|
| Anthrax             | livestock, wild animals, environment | direct contact, ingestion            |
| Avian influenza     | livestock, humans                    | may be zoonotic                      |
| Asian influenza     | poultry, ducks                       | direct contact                       |
| Bovine tuberculosis | cattle                               | milk                                 |
| Brucellosis         | cattle, goats, sheep, pigs           | raw products, milk                   |
| Cat scratch fever   | cats                                 | bite, scratch                        |

## DISCONTTOOLS 홈페이지(21)

 **DISCONTTOOLS**

[DISEASE DATABASE](#)
[WORKGROUPS](#)
[ABOUT DISCONTTOOLS](#)
[LINKS](#)

[About DISCONTTOOLS](#)

[About the disease database](#)

[Events](#)

[Contact](#)

**About DISCONTTOOLS**

On-going disease outbreaks highlight the necessity for not only producing new vaccines but also for improving existing vaccines and possibly providing marker vaccines. The use of vaccines and diagnostic tests are a key component as they have the potential to support control and eradication and to be highly cost effective. New and improved vaccines, diagnostics and pharmaceuticals are required for a wide range of major animal diseases. Effective tools for controlling animal diseases of major social and economic importance are vital not only for Europe but also for the rest of the world.

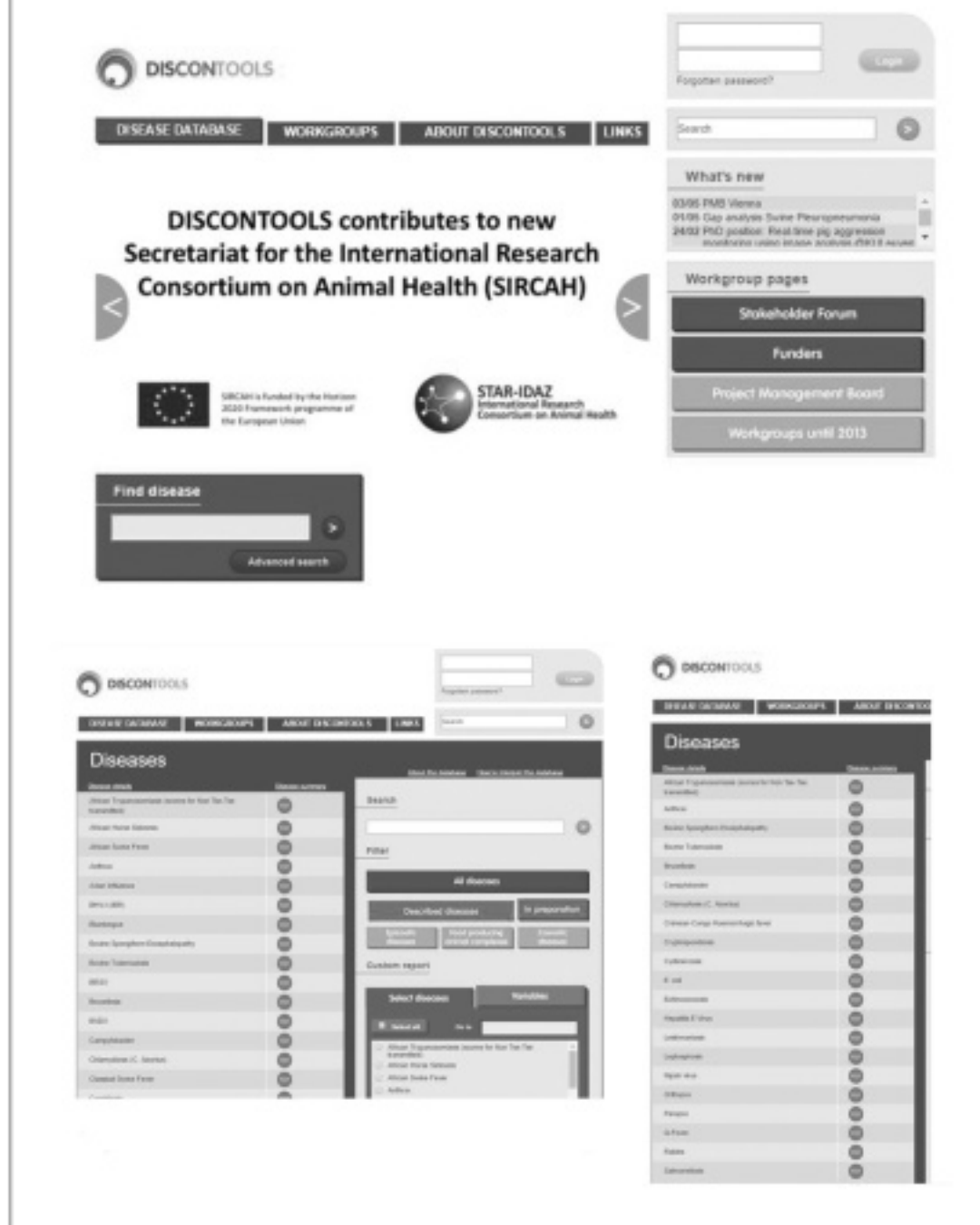
The DISCONTTOOLS project is funded by national funders of research from a range of countries with industry providing secretariat support along with management of the project.



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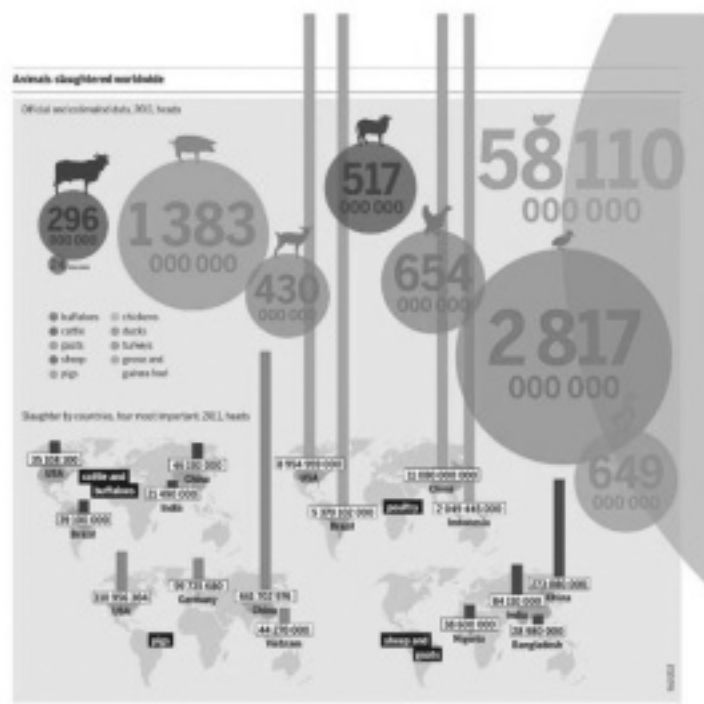
## DISCONTTOOLS 홈페이지(21)



## ■ 인수공통전염병 비교 (80)

[illegible]

- Different Animal population and density

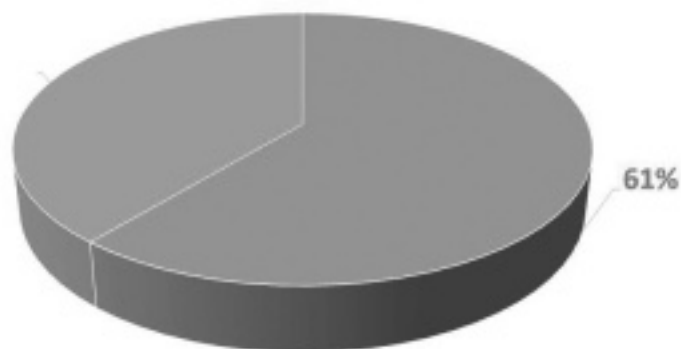




# ■ 사람 감염병의 최소 61%가 인수공통전염병

Human disease

(Data source : WHO)



■ Zoonotic disease ■ Human Only disease

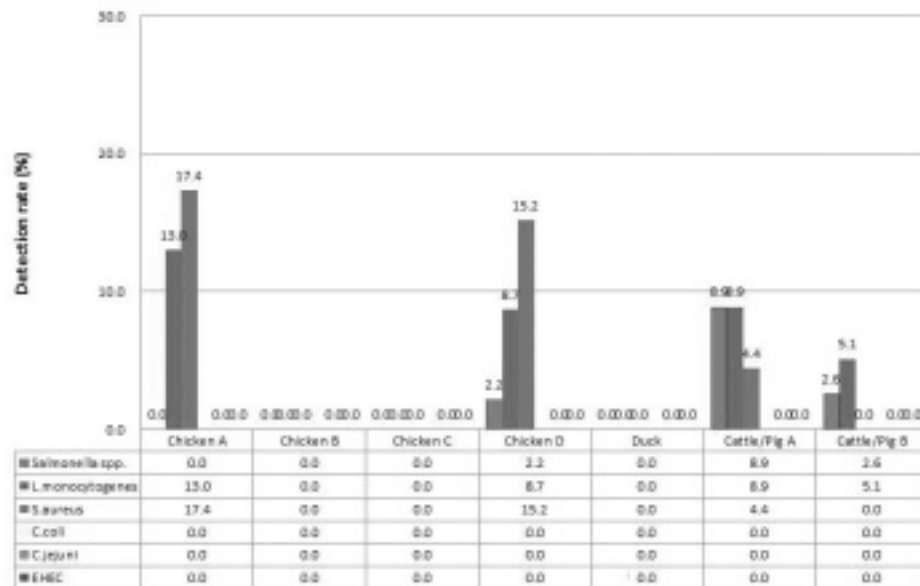
## One Planet, One Health



From Med-Vet Associa

## 3. 우리나라의 현실은?

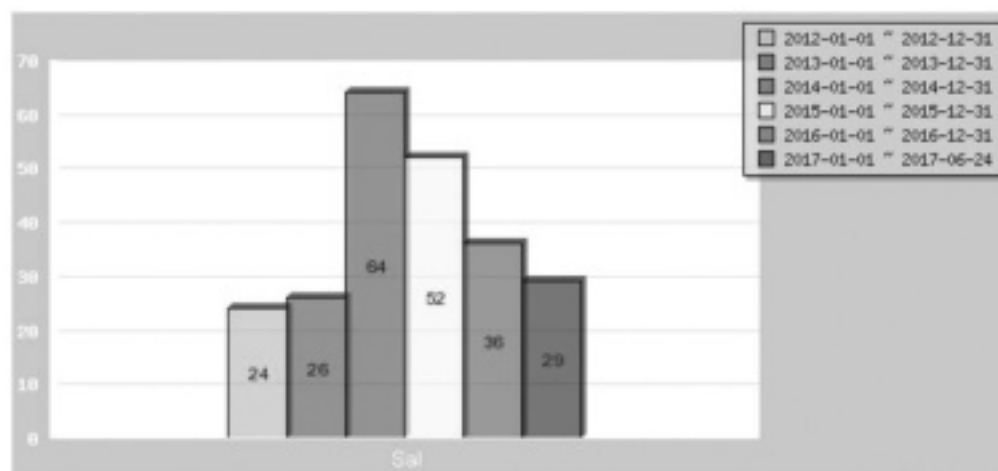
## ■ 실제 도축장에서 검출되는 세균들



## ■ 인수공통전염병 케이스(영국)

|                               | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014* |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Campylobacteriosis            | 52212 | 52679 | 58140 | 55787 | 65211 | 70371 | 72321 | 72629 | 66575 | 70353 |
| Salmonellosis (non-typhoidal) | 13708 | 14064 | 13279 | 11517 | 10486 | 9692  | 9395  | 8792  | 8461  | 9121  |
| Cryptosporidiosis             | 5413  | 4728  | 3668  | 4987  | 5647  | 4604  | 3573  | 6655  | 4111  | 4597  |
| VTEC O157                     | 958   | 1286  | 1120  | 1247  | 1815  | 1052  | 1484  | 1260  | 1015  | 1185  |
| Hepatitis E                   | 339   | 292   | 166   | 180   | 178   | 287   | 472   | 657   | 788   | 1054  |
| Lyme disease                  | 693   | 940   | 1027  | 1098  | 1093  | 1213  | 1189  | 1249  | 1060  | 955   |
| Pasteurellosis                | 425   | 490   | 457   | 487   | 559   | 586   | 668   | 666   | 717   | 776   |
| Toxoplasmosis                 | 114   | 123   | 146   | 457   | 494   | 414   | 364   | 328   | 325   | 370   |
| Non-O157 VTEC                 | 11    | 20    | 25    | 86    | 45    | 44    | 37    | 59    | 100   | 895   |
| Listeriosis                   | 223   | 208   | 254   | 207   | 234   | 179   | 165   | 185   | 178   | 188   |
| Leptospirosis                 | 60    | 50    | 81    | 76    | 56    | 42    | 52    | 78    | 50    | 78    |
| Taeniasis                     | 76    | 89    | 101   | 100   | 72    | 114   | 94    | 70    | 79    | 70    |
| Yersiniosis                   | 76    | 62    | 78    | 62    | 62    | 54    | 55    | 55    | 60    | 65    |
| Q fever                       | 61    | 200   | 71    | 68    | 31    | 55    | 114   | 126   | 47    | 61    |
| Mycobacterium bovis           | 26    | 29    | 24    | 23    | 29    | 36    | 39    | 39    | 30    | 39    |
| Psittacosis                   | 61    | 80    | 89    | 63    | 60    | 58    | 41    | 37    | 30    | 32    |
| Hydatid disease               | 11    | 14    | 10    | 18    | 9     | 7     | 15    | 6     | 13    | 16    |
| Brucellosis                   | 12    | 16    | 15    | 13    | 18    | 12    | 25    | 14    | 14    | 11    |
| Hantavirus                    | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 4     | 5     |
| Toxocariasis                  | 5     | 2     | 1     | 2     | 4     | 12    | 4     | 7     | 3     | 5     |
| Streptococcus suis            | 3     | 4     | 2     | 7     | 2     | 4     | 1     | 3     | 3     | 3     |
| Anthrax                       | 0     | 1     | 0     | 1     | 13    | 39    | 0     | 5     | 2     | 2     |
| Trichinellosis                | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     |
| Avian Influenza               | 0     | 1     | 4     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Rabies 'classical'            | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     |
| Rabies EBLV                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| vCJD15†                       | 5     | 5     | 5     | 2     | 3     | 3     | 5     | 0     | 1     | 0     |

## ■ 살모넬라 (MD : 3.60 / DVM : 3.25)



- Zoonotic *Salmonella* infections cause approximately 130,000 illnesses annually in the United States (Anderson, Marsden-Haug et al, 2017).
- Human Salmonellosis by *Salmonella typhimurium* : England (206 cases, 1989)
- Pork-related serotypes such as *Salmonella Typhimurium* and *Salmonella Derby* may become a serious human health hazard in the near future (Boyer, Haesebrouck et al, 2008)

## ■ 살모넬라(*Salmonella*)

- 대표적인 동물 유래 식중독균

### ■ 살모넬라 식중독 감염 비율

- In EU
  - 77% caused by *Salmonella*
- In USA
  - 40% caused by *Salmonella*
- In Korea
  - 3rd frequent pathogen

| 국내 식중독 원인균별 순위 |             |       |
|----------------|-------------|-------|
| 순위             | 원인균         | %     |
| 1              | 노로바이러스      | 11.48 |
| 2              | 병원성대장균      | 10.74 |
| 3              | 살모넬라        | 9.63  |
| 4              | 황색포도상구균     | 7.41  |
| 5              | 장염비브리오균     | 7.04  |
| 6              | 바실러스세레우스    | 5.56  |
| 7              | 캠필로박터제주니    | 5.19  |
| 8              | 자연독         | 2.22  |
| 9              | 클로스트리디움퍼프린스 | 1.85  |
| 10             | 기타바이러스      | 0.74  |

질병관리본부, 2010

## 인체 살모넬라 감염증 중 상당수가 돈육 유래

Table 1  
Salmonella isolated from pork in various countries\*

| Country       | Year | Sampling     | Sample    | All serotypes |      | Salmonella<br>Typhimurium %Pos |
|---------------|------|--------------|-----------|---------------|------|--------------------------------|
|               |      |              |           | N             | %Pos |                                |
| USA           | 1999 | Post-harvest | Raw meat  | 209           | 3.3  | ND                             |
| Great Britain | 1999 | Harvest      | Carcasses | 2509          | 5.3  | 2.1                            |
| Vietnam       | 2000 | Post-harvest | Raw meat  | 136           | 69.9 | ND                             |
| Mexico        | 2001 | Post-harvest | Raw meat  | 339           | 58.1 | 5.1                            |
| Belgium       | 2004 | Harvest      | Raw meat  | 374           | 12.3 | 4.0                            |
| Denmark       | 2004 | Harvest      | Carcasses | 34038         | 0.8  | 0.3                            |
| Finland       | 2004 | Harvest      | Carcasses | 6576          | 0    | -                              |
| Germany       | 2004 | Harvest      | Raw meat  | 4744          | 0.5  | 0.3                            |
| Hungary       | 2004 | Harvest      | Raw meat  | 8257          | 1.3  | 0.4                            |
| Italy         | 2004 | Harvest      | Raw meat  | 256           | 4.3  | 1.2                            |
| Italy         | 2004 | Harvest      | Carcasses | 1096          | 3.6  | 0.9                            |
| Latvia        | 2004 | Harvest      | Raw meat  | 185           | 1.1  | -                              |
| Malta         | 2004 | Harvest      | Raw meat  | 400           | 32.8 | -                              |
| Poland        | 2004 | Harvest      | Raw meat  | 895           | 0.2  | -                              |
| Portugal      | 2004 | Harvest      | Raw meat  | 256           | 15.2 | -                              |
| Spain         | 2004 | Harvest      | Raw meat  | 147           | 10.2 | -                              |

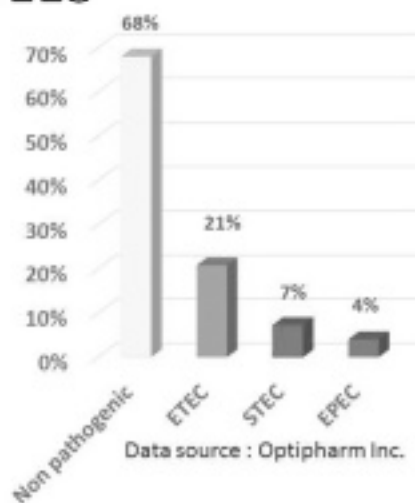
\* Data are from references Zhao et al. (2001), EFSA (2005), Davies et al. (2004), Phan et al. (2005), and Zaidi et al. (2006).

It has been estimated in various European countries that 15–23% of all cases of salmonellosis in humans, are related to the consumption of pork (Borch et al., 1996; Berends et al., 1998; Steinbach and Hartung, 1999; Van Pelt et al., 2000).

## 살모넬라의 항생제 내성

| Antimicrobial                                              | No. of positive |       |
|------------------------------------------------------------|-----------------|-------|
| Aminoglycosides                                            |                 |       |
| Gentamycin                                                 | 7               | 11.9% |
| Kanamycin                                                  | 15              | 25.4% |
| Spectinomycin                                              | 59              | 100%  |
| Penicillins                                                |                 |       |
| Ampicillin                                                 | 18              | 30.5% |
| Cephems                                                    |                 |       |
| Cephalothin                                                | 7               | 11.9% |
| Folate pathway inhibitors                                  |                 |       |
| Trimethoprim/sulfamethoxazole                              | 21              | 35.6% |
| Phenicol                                                   |                 |       |
| Chloramphenicol                                            | 24              | 40.7% |
| Quinolones                                                 |                 |       |
| Nalidixic acid                                             | 4               | 6.8%  |
| Tetracyclines                                              |                 |       |
| Tetracycline                                               | 59              | 100%  |
| $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations |                 |       |
| Amoxicillin/clavulic acid                                  | 6               | 10.2% |

## ■ 대장균 감염증



(Melton-Celsa 2014)

| Toxin type(s)                           | Prototype strain used for determination of its subtype <sup>a</sup> | Linked with serious human disease; difference(s) from prototype toxin <sup>b</sup>                 | Reference(s) |
|-----------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------|
| Stx                                     | 263BT                                                               | Yes                                                                                                | (135)        |
| Stx1a                                   | 100,933 (makes Stx1a and Stx2a)                                     | Yes                                                                                                | (135)        |
| Stx1c                                   | D63333                                                              | No, immunologically distinct                                                                       | (136, 137)   |
| Stx1d                                   | M0803                                                               | No, immunologically distinct, less potent                                                          | (136)        |
| Stx1e                                   | 100,933 (makes Stx1a and Stx2a)                                     | Yes                                                                                                | (135)        |
| Stx2b (originally named VT-2d or Stx2d) | 10230                                                               | No, the H subunit gene was not detected by methods used to detect other <i>stx</i> H subunit genes | (24)         |
| Stx2c                                   | 400                                                                 | Yes, less toxic to Vero cells and mice                                                             | (137)        |
| Stx2d (Stx2ba)                          | C16542                                                              | Yes, more toxic after incubation with riboflavin, less toxic to Vero cells                         | (136)        |
| Stx2e                                   | 81291                                                               | No, binds to Gb4, associated with disease in pigs                                                  | (136)        |
| Stx2f                                   | 7c                                                                  | No, the <i>stx</i> gene is not amplified by primers specific for <i>stx</i>                        | (140)        |

## ■ 리스테리아



Scanning electron micrograph of *Listeria monocytogenes*

### Scientific classification

Domain: Bacteria  
 Kingdom: Eubacteria  
 Phylum: Firmicutes  
 Class: Bacilli  
 Order: Bacillales  
 Family: Listeriaceae  
 Genus: *Listeria*  
 Species: *L. monocytogenes*

### Bacterial name

*Listeria monocytogenes*  
 (E. Murray et al. 1926) Price 1940



Normal anatomy of brain and spinal cord



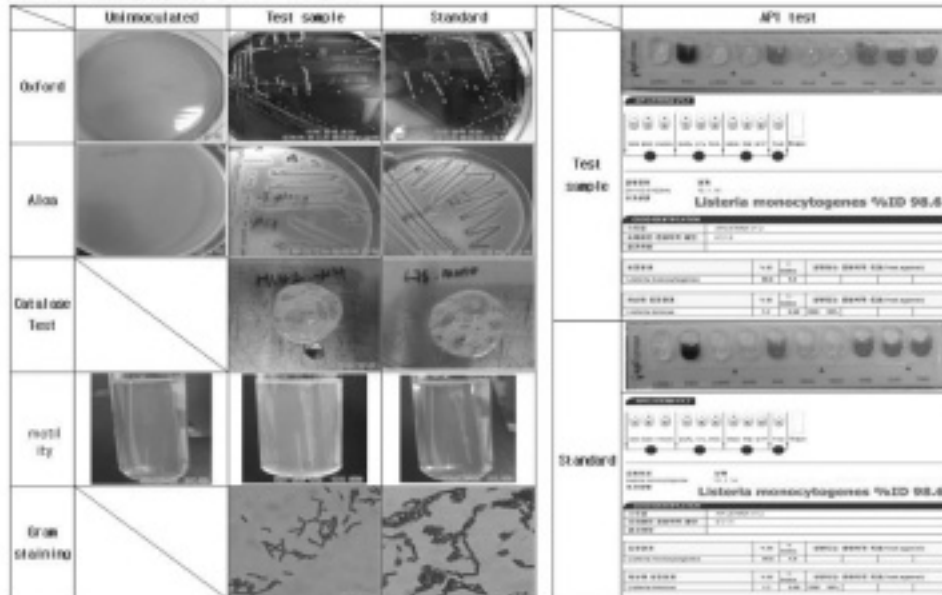
Brain and spinal cord with bacterial meningitis

Case Fatality : 15% (210 / 2,161 cases (Europe))

| Diseases    | CFSPH | UK Gov. | Discontools |
|-------------|-------|---------|-------------|
| Listeriosis |       | ○       |             |

## 도축장에서 검출되는 *Listeria monocytogenes*

*Listeria monocytogenes* (211412-0142)-M



## 영국의 리스테리아(2006 to 2015)

(*Listeria* data 2006 to 2015)

Table 1: Annual cases of *Listeria monocytogenes* in England and Wales

| Year | Number of cases | Cases per 100,000 population |
|------|-----------------|------------------------------|
| 2006 | 185             | 0.34                         |
| 2007 | 226             | 0.42                         |
| 2008 | 181             | 0.33                         |
| 2009 | 213             | 0.39                         |
| 2010 | 160             | 0.29                         |
| 2011 | 148             | 0.26                         |
| 2012 | 167             | 0.30                         |
| 2013 | 160             | 0.28                         |
| 2014 | 169             | 0.29                         |
| 2015 | 169             | 0.29                         |

Figure 1: Annual cases of *Listeria monocytogenes* in England and Wales

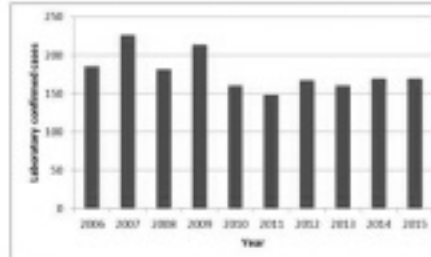


Figure 2: Age-sex breakdown of *Listeria monocytogenes* laboratory reports

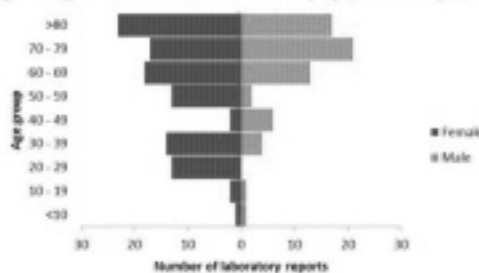
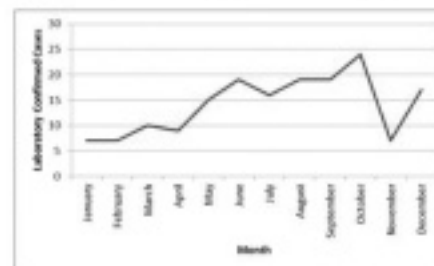


Figure 3: Seasonal trend of laboratory reports of *Listeria monocytogenes* in England and Wales





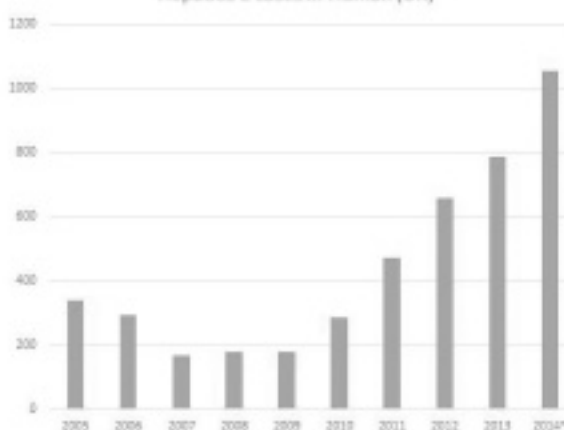
## E형 간염

Table 1. IgG anti-HEV prevalence in swine from commercial herds in the United States

| Herd | Age    | No. of swine tested | No. of swine with anti-HEV (%) |
|------|--------|---------------------|--------------------------------|
| A    | 6 wk   | 8                   | 0 (0)                          |
|      | 12 wk  | 8                   | 0 (0)                          |
|      | 20 wk  | 8                   | 8 (100)                        |
|      | 26 wk  | 8                   | 5 (63)                         |
|      | Adult  | 25                  | 14 (56)                        |
| B    | 3-4 wk | 8                   | 0 (0)                          |
|      | 5-6 wk | 8                   | 0 (0)                          |
|      | 7-8 wk | 8                   | 0 (0)                          |
|      | 13 wk  | 12                  | 10 (83)                        |
|      | 6 mo   | 8                   | 8 (100)                        |
| C    | Adult  | 17                  | 16 (94)                        |
|      | 2 mo   | 8                   | 1 (13)                         |
|      | 3 mo   | 8                   | 8 (100)                        |
|      | 4 mo   | 8                   | 4 (50)                         |
|      | 5 mo   | 8                   | 8 (100)                        |
| D    | Adult  | 8                   | 8 (100)                        |
|      | 2 mo   | 10                  | 2 (20)                         |
|      | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
| E    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| F    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| G    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| H    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| I    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| J    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| K    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| L    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| M    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| N    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| O    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |
| P    | 6 mo   | 10                  | 10 (100)                       |
|      | 8 mo   | 10                  | 10 (100)                       |
|      | 10 mo  | 10                  | 10 (100)                       |
|      | 12 mo  | 10                  | 10 (100)                       |
|      | 14 mo  | 10                  | 10 (100)                       |

\*Specific-pathogen-free (SPF) swine herd.

Hepatitis E cases in Human (UK)



Data source : Laboratory-confirmed cases of zoonotic disease in humans, 2005-2014 / United Kingdom

표 1. 4℃ 냉장저장 시 돼지고기 초기오염 정도에 따른 저장기간별 미생물수 변화(단위 : c.f.u./g)

| 초기<br>오염정도      | 1일                   | 7일                   | 14일                  | 21일                  |      |
|-----------------|----------------------|----------------------|----------------------|----------------------|------|
|                 |                      |                      |                      | 총세균수                 | 대장균수 |
| 10 <sup>2</sup> | 4.15×10 <sup>2</sup> | 4.10×10 <sup>3</sup> | 1.16×10 <sup>4</sup> | 2.58×10 <sup>5</sup> | -    |
| 10 <sup>3</sup> | 4.90×10 <sup>3</sup> | 1.99×10 <sup>4</sup> | 3.24×10 <sup>5</sup> | 3.35×10 <sup>6</sup> | 4    |
| 10 <sup>4</sup> | 1.46×10 <sup>4</sup> | 5.95×10 <sup>4</sup> | 8.60×10 <sup>5</sup> | 1.65×10 <sup>7</sup> | 315  |

(농촌진흥청 축산과학원)

10일이면 12,000km 이동 가능!



## Plant Quality Audit

※제품검사이전 도제

| 번호 | 제품명      | 세균수<br>(CFU/100g)   | 대장균수   |
|----|----------|---------------------|--------|
| 1  | #810 앞다리 | 2.7x10              | ND     |
| 2  | #810 배   | 2.4x10              | ND     |
| 3  | #810 목   | 7.4x10              | ND     |
| 4  | #810 앞다리 | 4.0x10 <sup>7</sup> | ND     |
| 5  | #810 목안쪽 | 6.1x10 <sup>7</sup> | 1.0x10 |

앞다리  
세균수 : 2.7x10<sup>7</sup>  
대장균수 : ND

목  
세균수 : 7.4x10<sup>7</sup>  
대장균수 : ND

앞다리  
세균수 : 4.0x10<sup>7</sup>  
대장균수 : ND

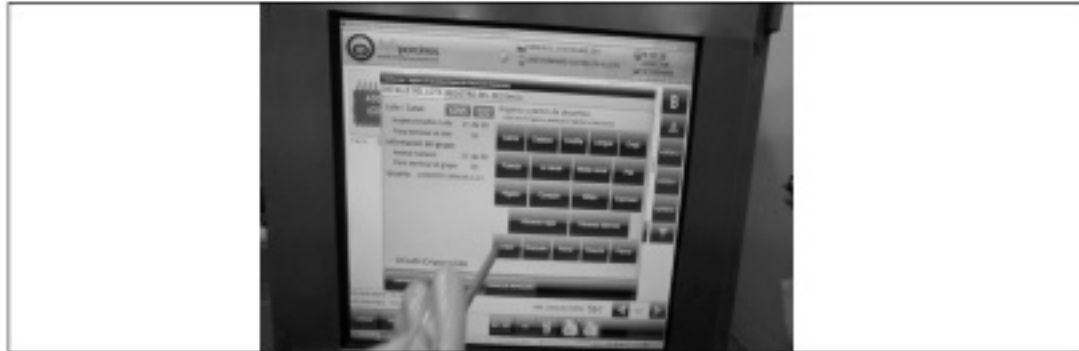
배  
세균수 : 2.4x10<sup>7</sup>  
대장균수 : ND

목안쪽  
세균수 : 6.1x10<sup>7</sup>  
대장균수 : 1.0x10<sup>7</sup>



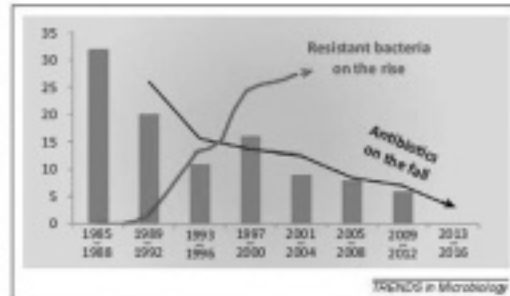
제36회 전국양돈세미나

LET'S GO! 한돈 유비무환!



#### 4. 항생제 내성 문제

##### ■ 항생제 내성 세균 문제



##### ■ 판매량이 증가하고 있는 항생제

