

Korea's experience of total ban of antibiotics in animal feed

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Contents

- **Background**
- **Consequence of total Ban**
 - Antimicrobial consumption
 - Antibiotic resistance
 - Animal and Human health
 - Animal productivity
- **Summary**

Background

Republic of Korea

- **Population**(x1,000 people) : 51,270
- **Number of livestock** (x1000 head)

	2,006	2,016	Increase /decrease (2016/2006)
Beef cattle	1,959	2,705	38.1
Dairy cattle	471	406	-13.9
Pigs	9,198	10,426	13.4
Chicken	126,668	168,642	33.1



(source: Statistics Korea)

Major Regulations for antimicrobial use in livestock

- **Pharmaceutical Affairs Act**

(Ministry of Health and Welfare, Ministry of Food and Drug Safety)

- **Handling Rules of Animal Medicines and Others**

(Minister of Agriculture, Food and Rural affairs)

- **Regulatory Guidelines on use of Animal Medicines for Formula Feed (MAFRA)**

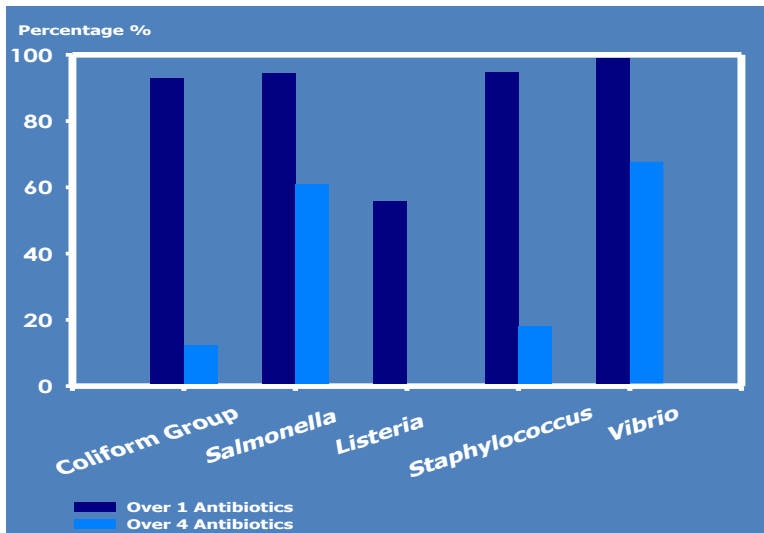
- **Regulatory Guidelines of designation for Prescription Animal Medicines (MAFRA)**

- **Guidelines on safe use of Animal Medicines (QIA under MAFRA)**

Press release of AMR bacteria contamination in various foods

Heavy contamination of **Multi-Drug Resistant bacteria** in 18 major food items including beef, pork, and fisheries

- **100% of *Salmonella*** isolates showed **resistance to one more antimicrobial**
- Furthermore, **63% of *Salmonella*** isolates showed **resistance to four more antimicrobials**



Press Release : 'Korea Consumer Protection Board' in 2002

Press release of heavy use in animals and AMR contamination in animal products

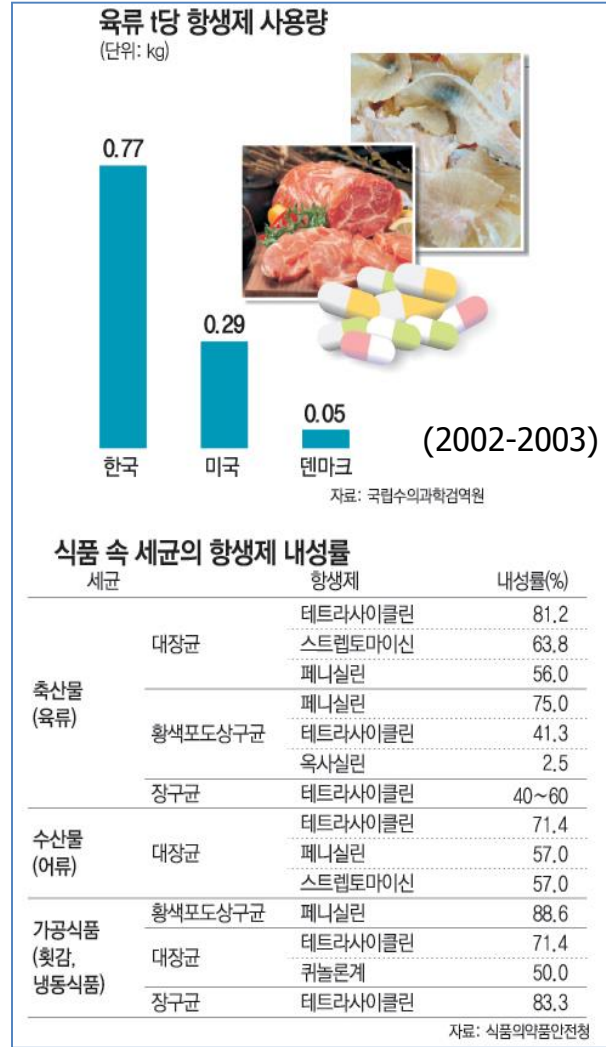
국민일보 식품에 '항생제 내성균' 많다...검출률 94%가 내성있어 **본문듣기**
 기사입력 2002-07-09 21:35 | 최종수정 2002-07-09 21:35 | **추천** 0 | **추천** 0

[환경이 아프면 몸도 아프다] 6. 항생제 범벅된 가축 사료
 [중앙일보] 입력 2004.04.22 17:19 | 수정 2006.06.01 00:33 | **종합 252** | **지면보기**

한겨레 | 사회 의료/건강
 여론칼럼 | 정치 | 경제 | 사회 | 스포츠 | 국제 | 증권 | 문화생활 | IT과학 | 만화만평 | 전체기사 | 지난기사
 home > 사회 > 의료/건강 | 편집 2003.07.09(수) 20:13 | 검색 | 상세검색
항생제 범벅 소·돼지고기 유통

소·돼지고기 항생제 범벅...외국의 3~24배
 우리나라는 92.1%, 스페인(91%), 프랑스(89%) 캐나다(81.9%) 등에 비해 가장 높아
(2006. CBS)

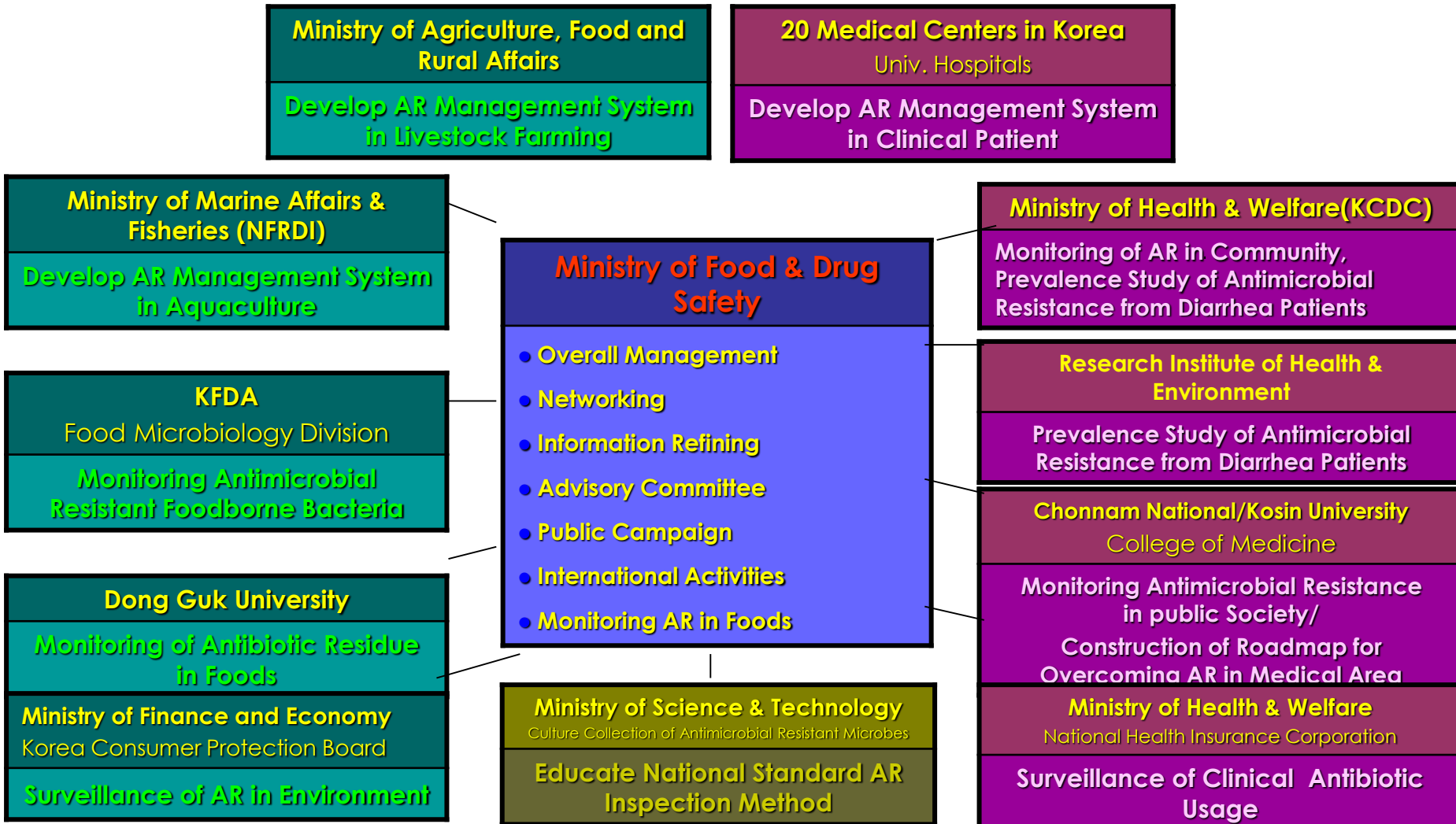
[세상살이 복음살이] 항생제 범벅 먹을거리 식탁 대침공
 "당신의 몸은 안녕하십니까"
 열악한 농업 환경·화학약품 남용에 면역체계 '적신호'
 지속적 환경보전 위한 인식 변화·선택적 소비가 대안
 발행일 2009-06-07 [제2651호, 14면]



Launch the National Antimicrobial Resistance Management Program - Relevant government ministry & academia

Non-human sector

Human sector



Main activities of national project on AMR (2003 – 2012)

- Organizing an Advisory Committee 'Board of National Antimicrobial Resistance Experts'(35)
- Developing of monitoring program on antimicrobial consumption and resistance in clinical, livestock & fishery sectors
- **Implementing of risk management measures** on antimicrobial resistance in livestock & fishery sectors
- Investigating antimicrobial resistance in Foods
- Establishing the national surveillance network
- Education and training for prudent use of antibiotics in both humans and animals

Early warnings and actions

- 1969 Swann Committee recommends **restrictions on antimicrobials in animal feed**
- 1997 WHO scientific meeting concludes that it is 'essential to replace growth promoting antimicrobials'
- 1998 EU bans four antimicrobials in animal feed as 'precautionary' measure.
- 1999 EU Scientific Steering Committee recommends phase-out of antimicrobials that may be used in human/animal therapy
- 2000 **WHO recommends ban on antimicrobials as growth promoters if used in human therapy and in absence of risk-based evaluation**
- 2006 Total ban on antibiotics as growth promoters in EU

(Source : "Late lessons from early warnings: the precautionary principle 1896–2000 " : Antimicrobials as growth promoters: resistance to common sense, LE Edqvist&KB Pedersen, 93-100)

Actions of AMR management in Livestock

1. Establishing the national monitoring program

- Korean Veterinary Antimicrobial Resistance Monitoring System

2. Implementation of regulation on antimicrobial use

- Regulatory Guidelines on use of Animal Medicines for Formula Feed

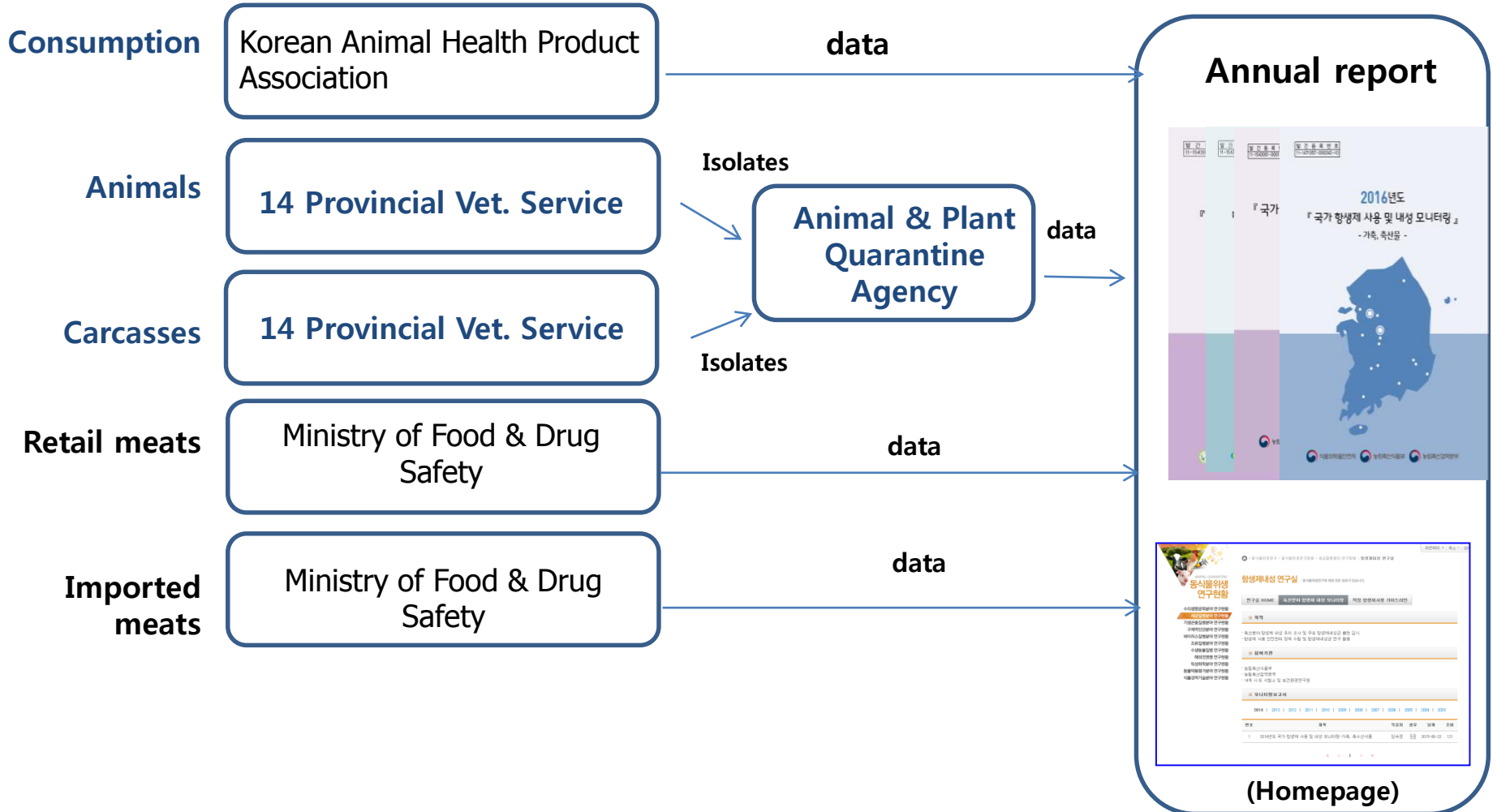
: **Antimicrobial resistance committee** decided the ban of antibiotic addition in animal feed **according to international guidelines**

* **Antimicrobial resistance committee** was comprised of academics, government officials, and producers' groups

- Regulatory Guidelines of designation for Prescription Animal Medicines
- Guidelines on safe use of Animal Medicines

KVARMS

(Korean Veterinary Antimicrobial Resistance System)

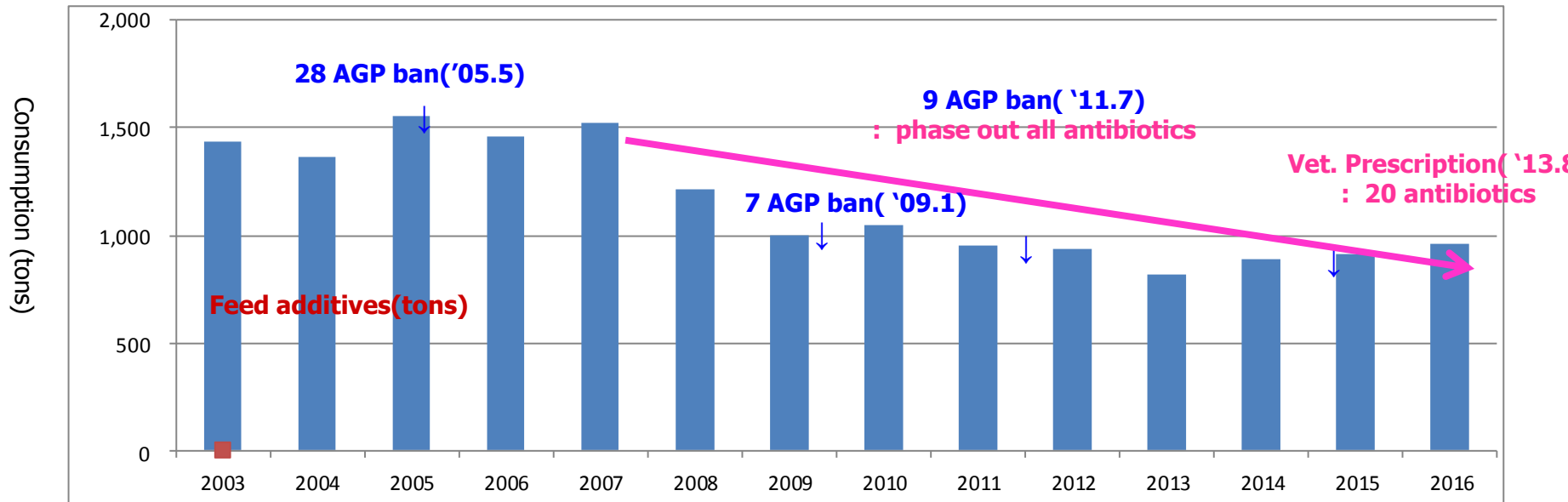


Banned antibiotics in animal feed

- 1997-2003
: avoparcin, spiramycin, olaquinoxid, spectinomycin, flubendazol etc
 - 2005. 05 (53→25)
: Oxytetracycline HCl, Erythromycin, Sulfadimethoxine etc
 - 2009.01 (25→18)
: Oxytetracycline, Chlortetracycline, Bacitracin zinc, Colistin sulfate, Lincomycin hydrochloride, Neomycin sulfate, Penicillin
 - 2011. 07 (18→9 inophores)
: apramycin, avilamycin, bambamycin, bacitracin methylene disalicylate , enramycin, tiamulin, tylosin, virginiamycin, sulfathiazole
- * **Nine inophores** : Narasin, Diclazuril, Lasalocid, Madurmycin, Monensin, Salinomycin, Semduramycin, Clopidol, Fenbenzazole

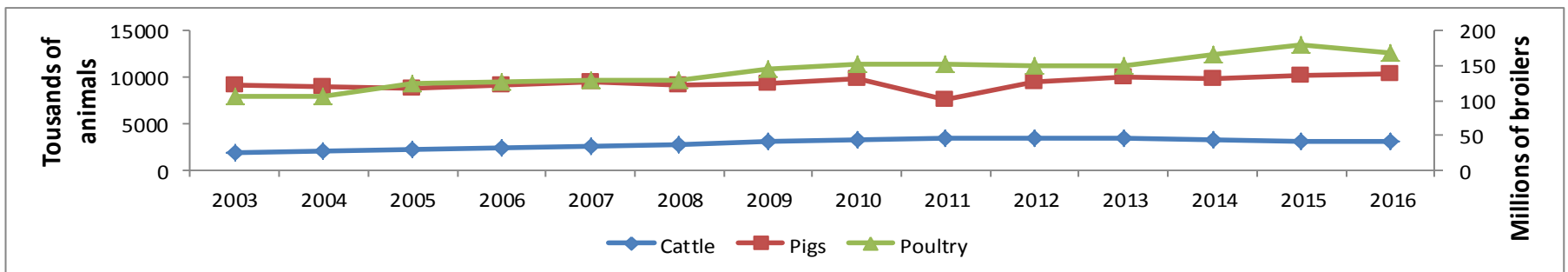
Consequence of Banning of antibiotics in animal feed

Consumption of antimicrobials



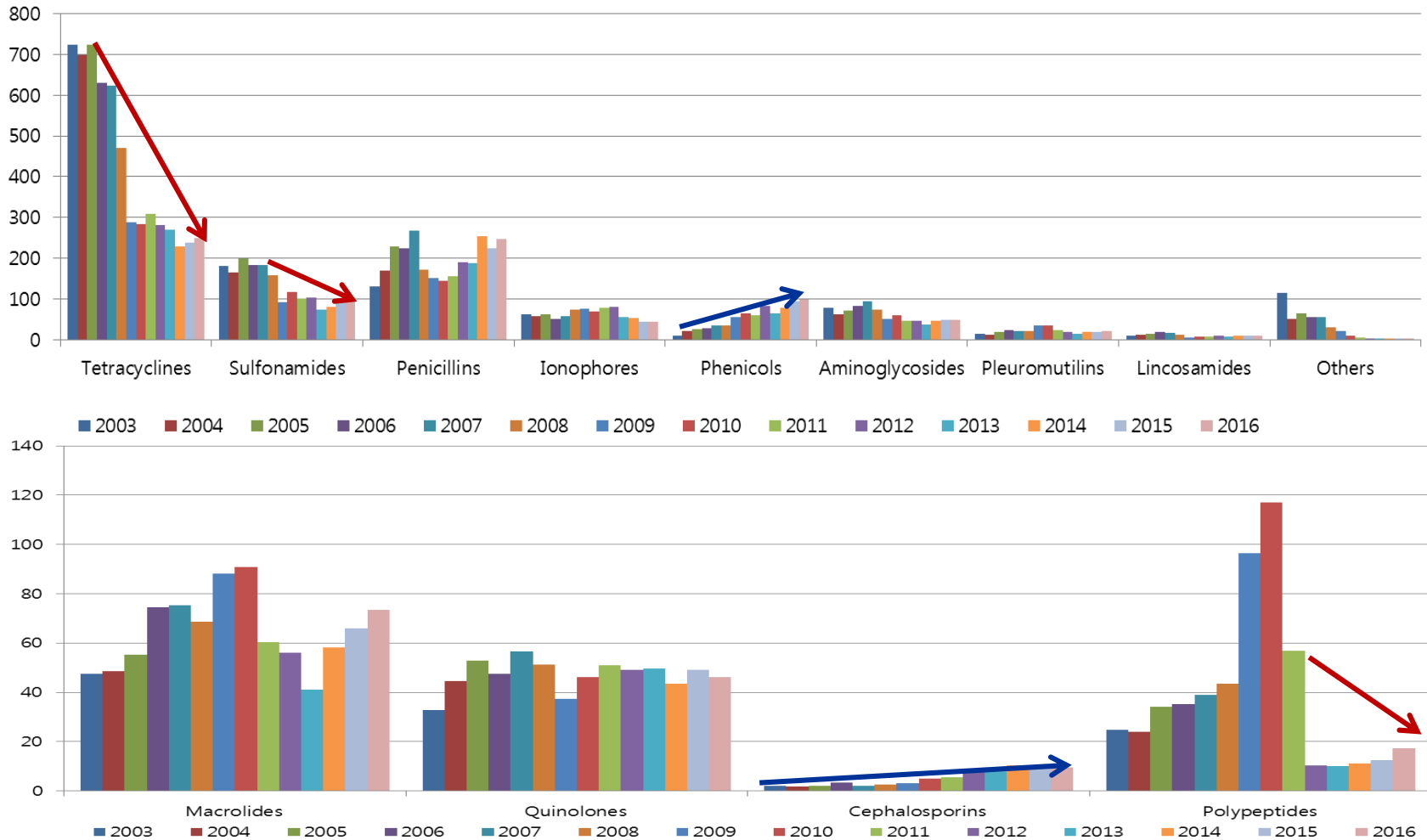
(Source: Korea Animal Health Products Association)

No. of livestock(x1,000 head)



(Source: Statistics Korea)

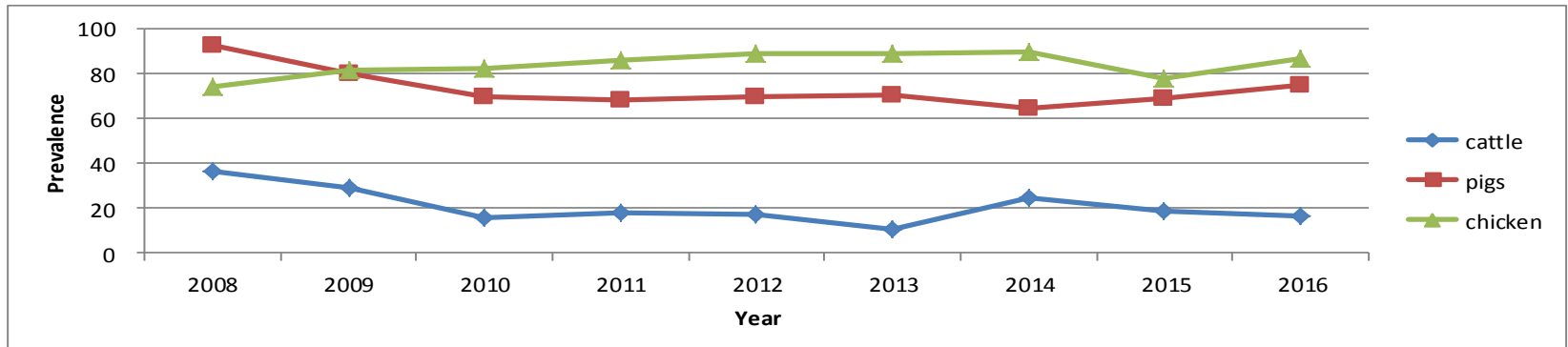
Consumption by antimicrobial classes



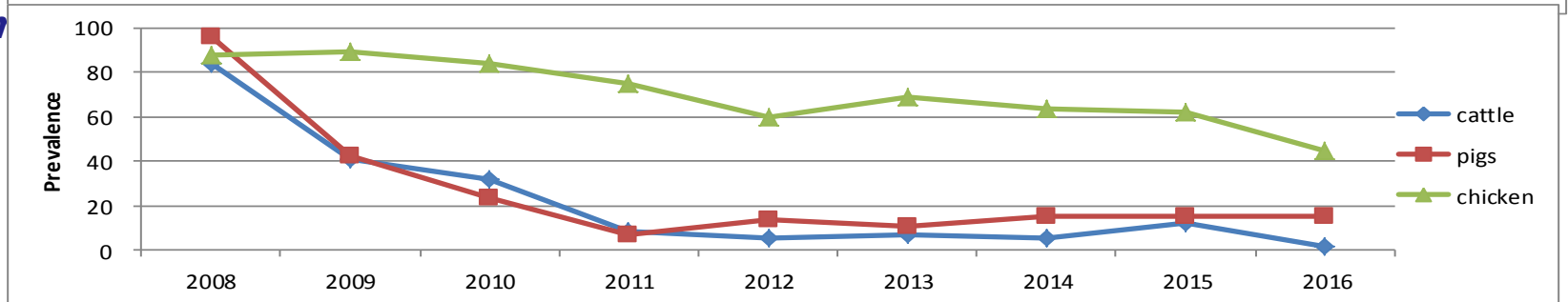
(Source: Korea Animal Health Products Association)

Prevalence of multiple drug resistance in indicator bacteria from healthy animals

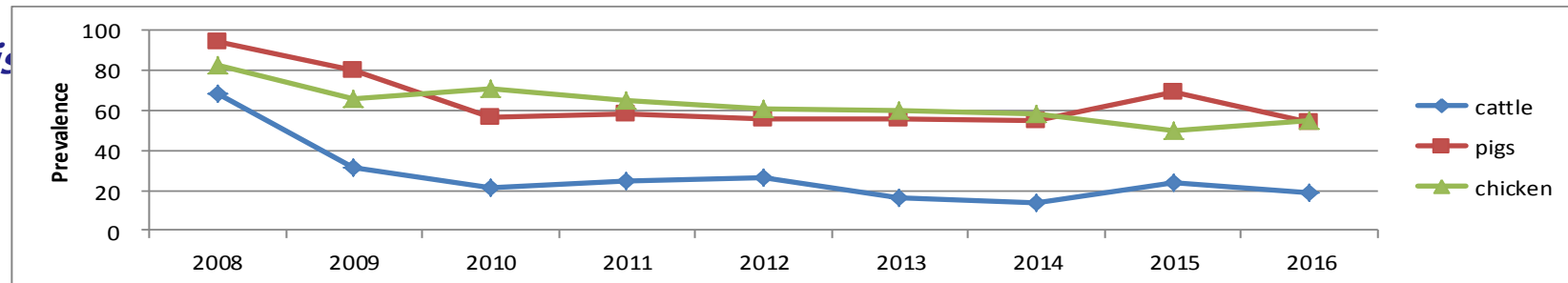
E. coli



E. faecium



E. faecalis

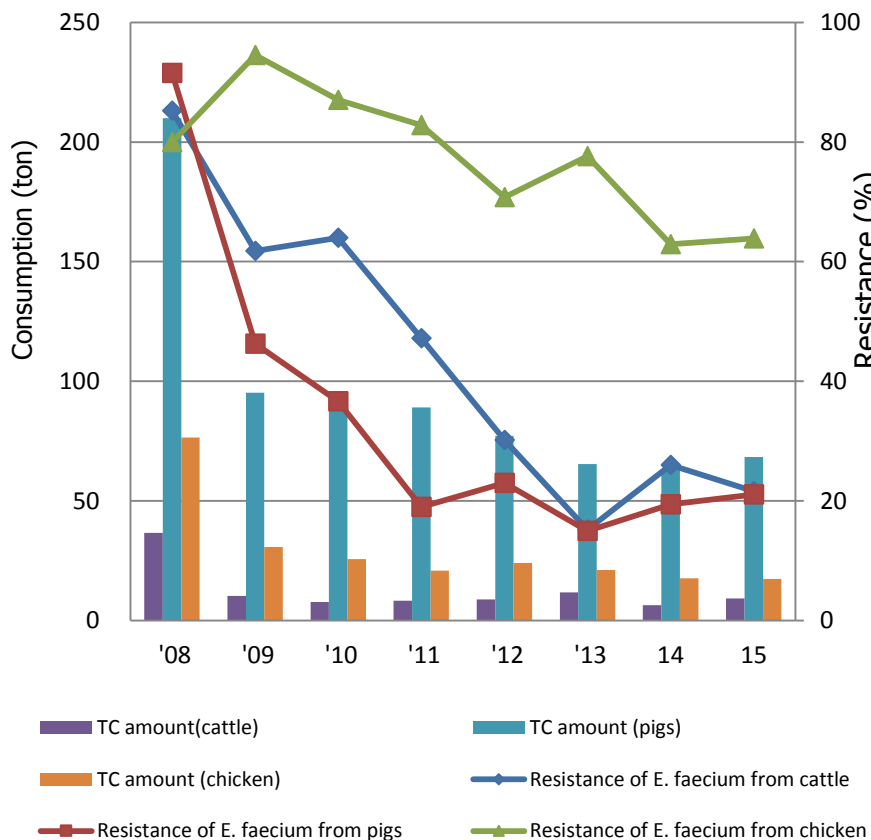


* Multiple drug resistance : ≥ 3 subclasses

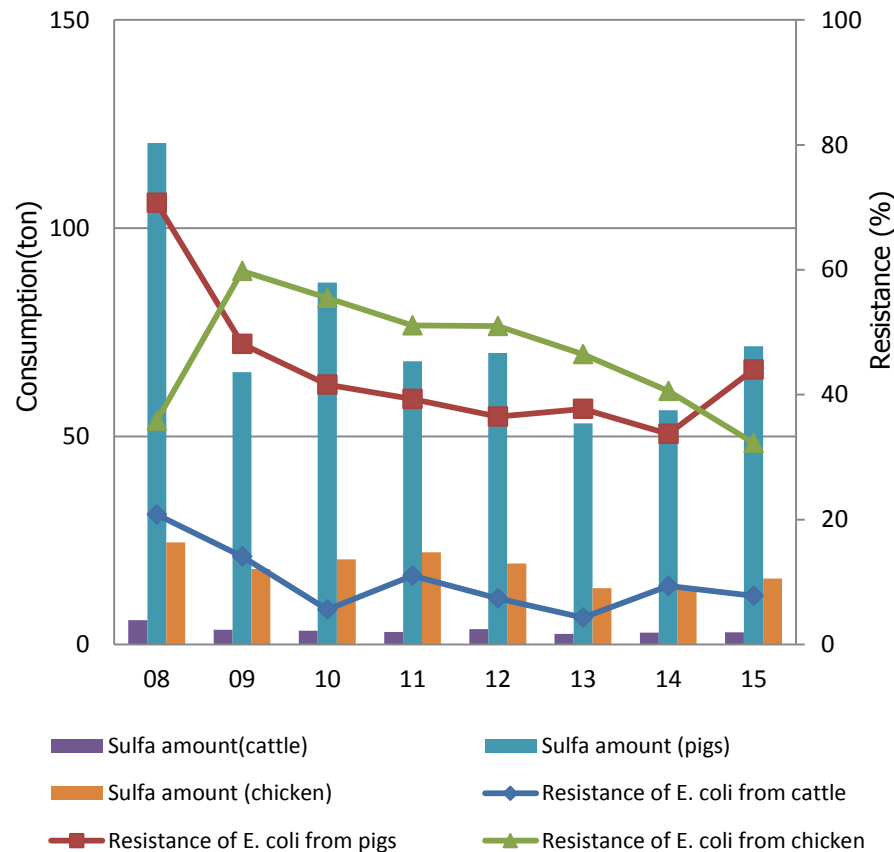
(Source : KVARMS)

Comparison of consumption and resistance

Tetracyclines (*E. faecium*)



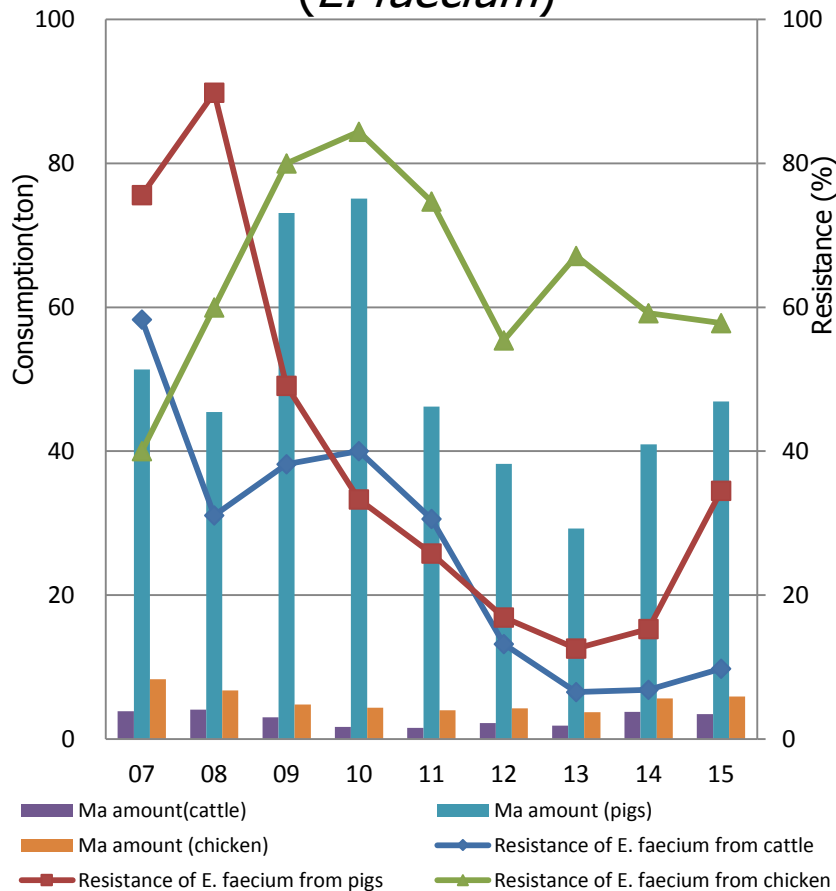
Sulfonamides (*E. coli*)



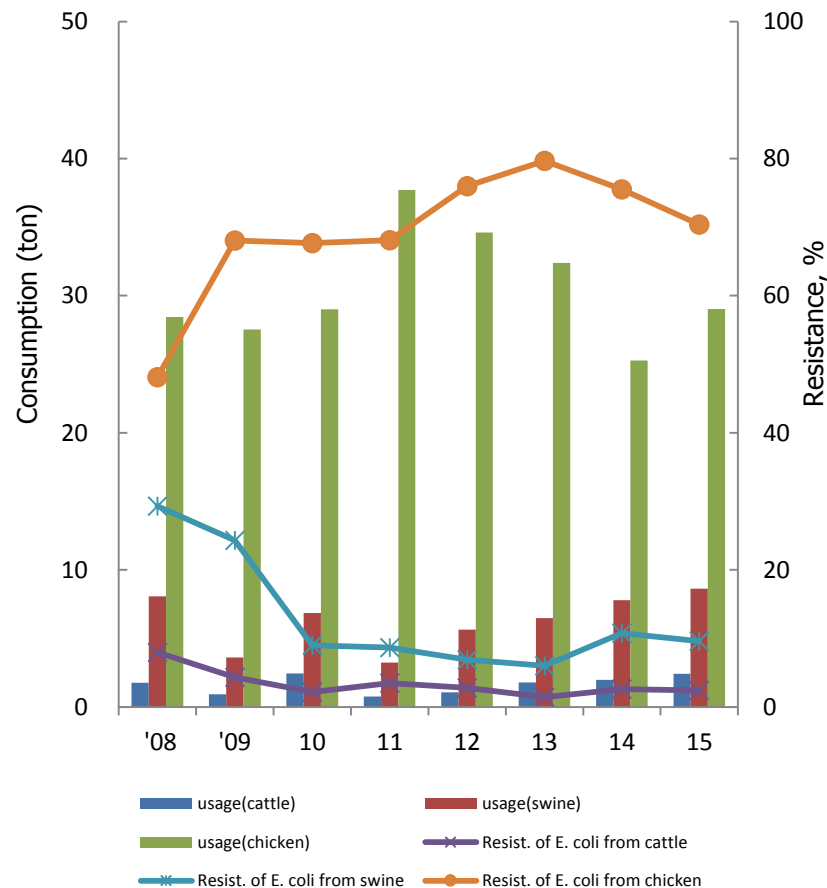
(Source: KAKPA, KVARMS)

Comparison of consumption and resistance

Macrolides (*E. faecium*)



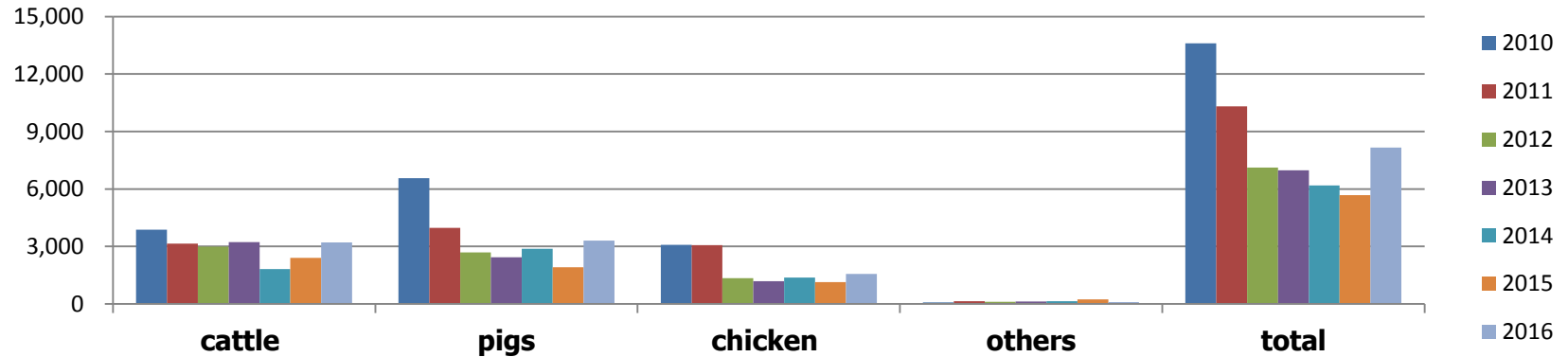
Fluoroquinolones (*E. coli*)



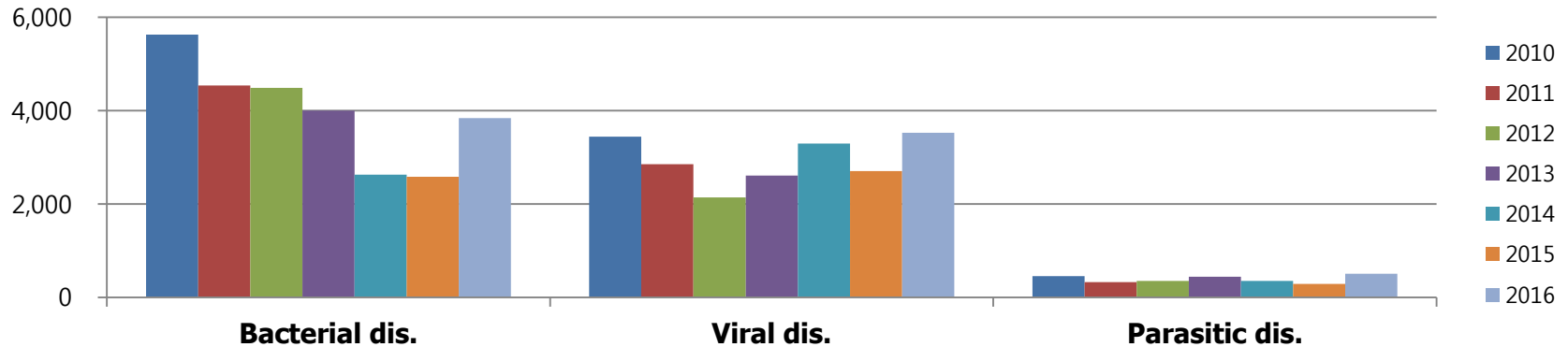
(Source: KAKPA, KVARMS)

Diagnostic submission

Number of submission



Etiology of diagnosis

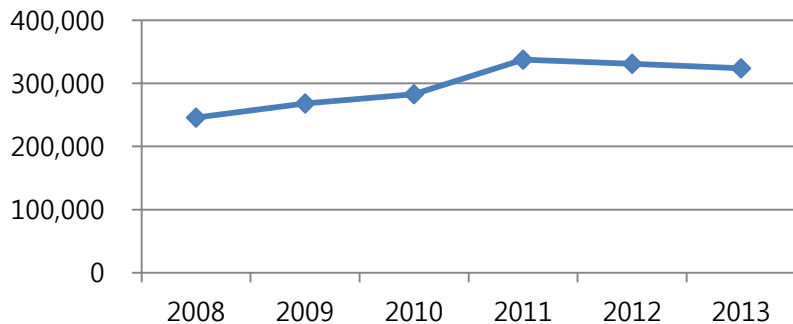


(Source : Korea Animal Health Integrated System)

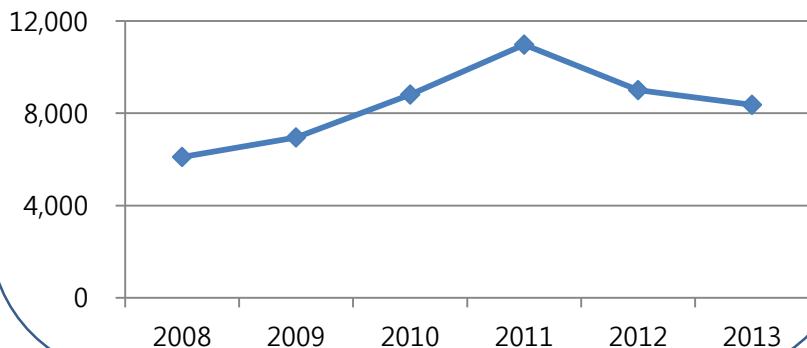
Impacts on livestock production

Pig

Raising cost of hog per head

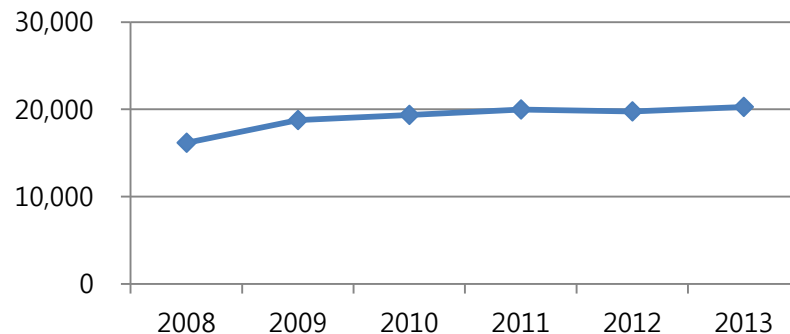


Veterinary & medicine cost

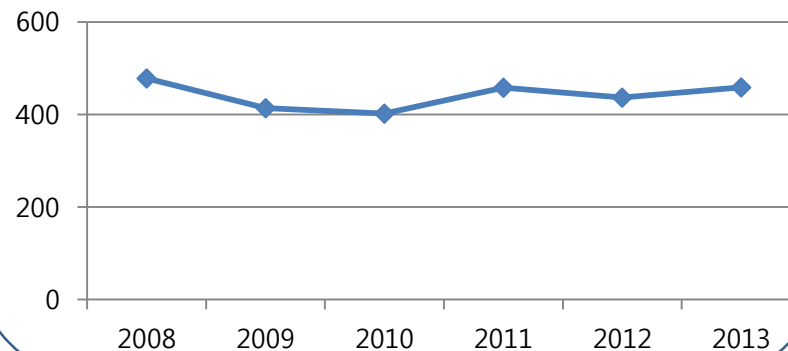


Broiler

Raising cost of broiler per 10 head

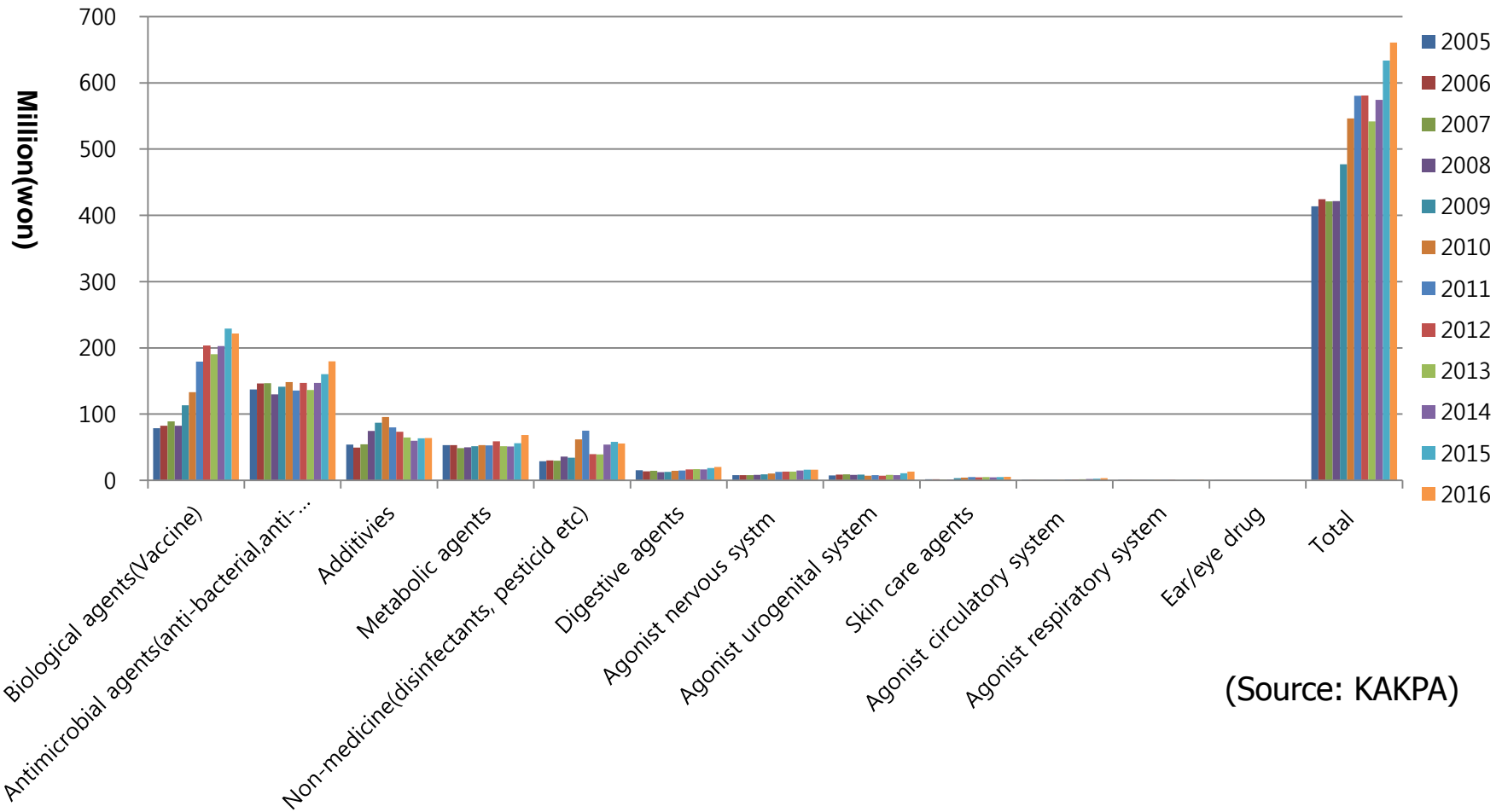


Veterinary & medicine cost



(source : Statistics Korea)

Sales of Vet. medicine



(Source: KAKPA)

Pig farm productivity after banning of antibiotics

Table 8. Comparisons of productivity between pre- and post-ban on use of antibiotic growth promoters.

Item	Citation data ^{a)}			Present study 2012
	2003	2010	2012	
Live pig born per litter, head	10.1	10.6	10.6	10.6
Weaning piglet, head	9.1	9.5	9.6	9.7
Pre-weaning mortality, %	7.0	9.7	9.5	8.6
Post-weaning mortality, %	10.3	15	16.3	10.4
Sow turnover rate	2.32	2.26	2.29	2.23
MSY, head	19.6	18.5	18.6	19.0

^{a)}Data were quoted from Korea pork producers association (2013). The numbers of survey farm on citation data, except for MSY, are 142 farmers in 2003, 428 farmers in 2010, and 74 farmers in 2012. The survey farms on MSY are 35, 99, and 89 in 2003, 2010, and 2012, respectively.

(MSY, marketing per sow per year)

(Source : Kim et al., CNJ Journal of Agriculture Science, 2015)

Broiler productivity

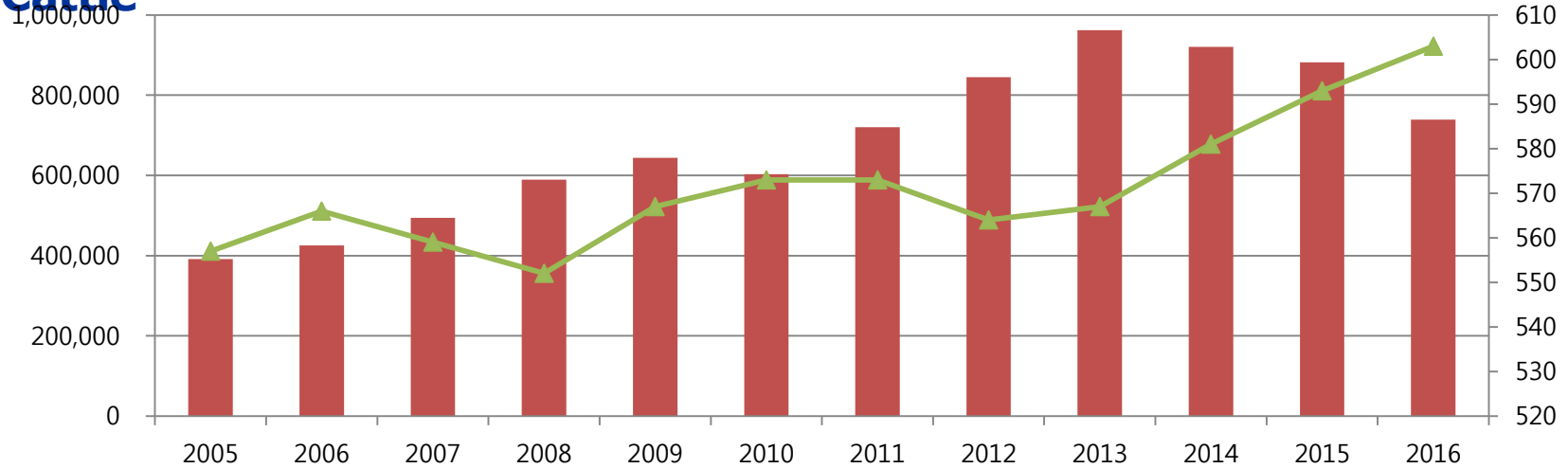
	2000	2005	2010	2011	2012	2013
Growth rate	62.3	93.8	92.7	92.7	95.1	95.1
Raising days	38.8	37.6	33.13	33.58	32.67	32.7
Slaughtering weight	1.53	1.38	1.44	1.45	1.45	1.45
Feed conversion	1.78	1.58	1.6	1.6	1.57	1.55
Weight gained per day	39.4	37.6	43.5	43.2	44.4	44.3
Productivity index*	204.2	218.4	252.1	250.9	268.1	272.2

* Productivity index : Growth rate x slaughtering weight x raising days x feed conversion

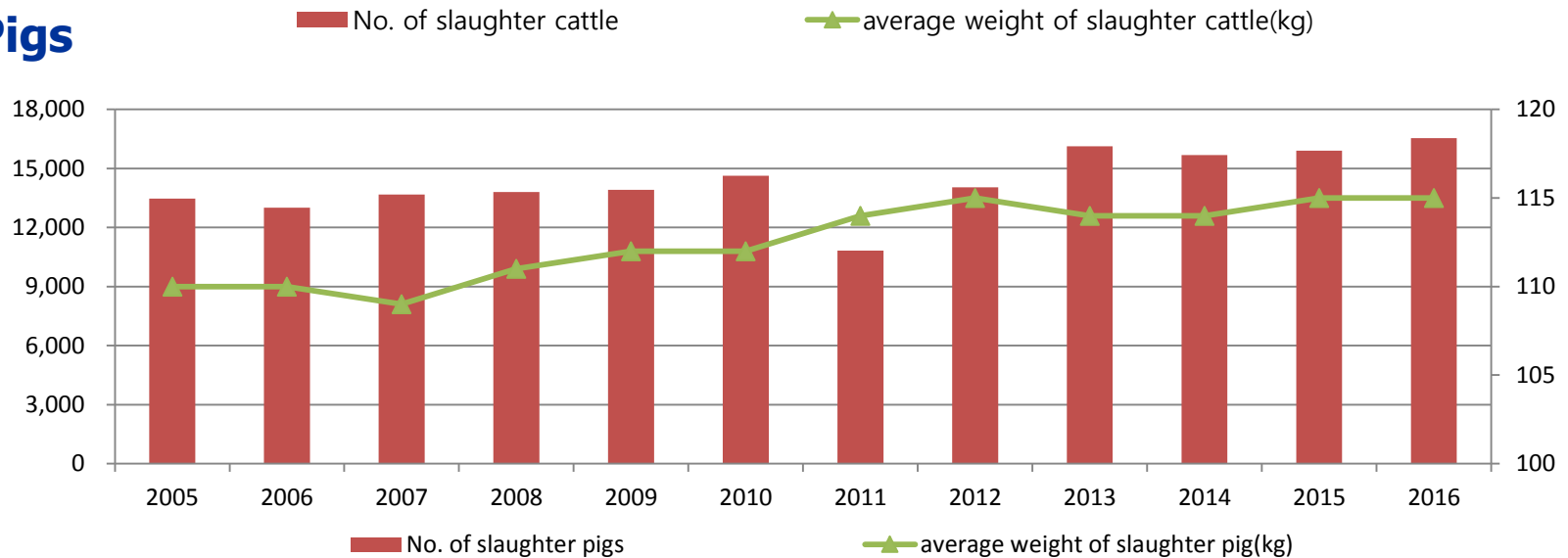
(Source : Korea Rural Economic Institute)

Number of slaughter animals

Cattle

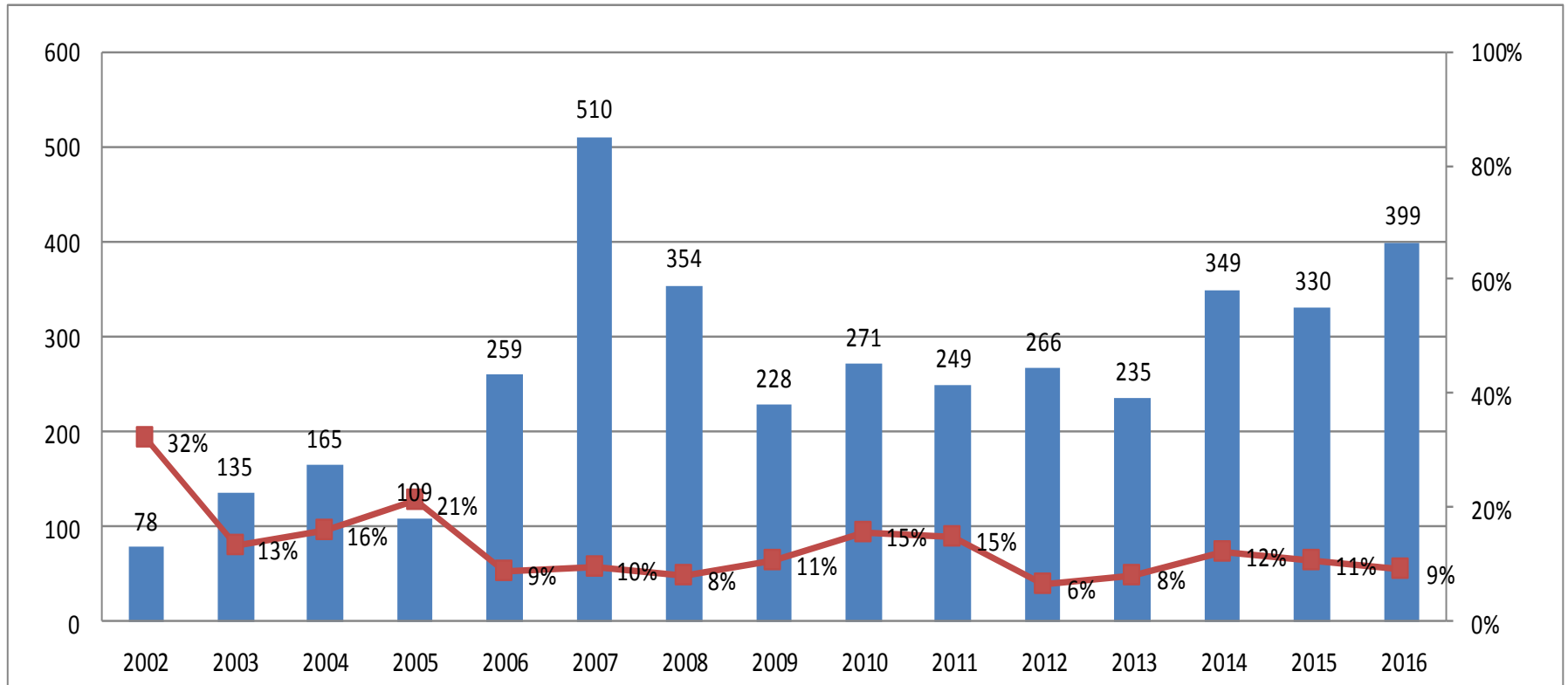


Pigs



(Source : Animal and Plant Quarantine Agency)

Trends of incidence of *Salmonella* & *Campylobacter* in humans



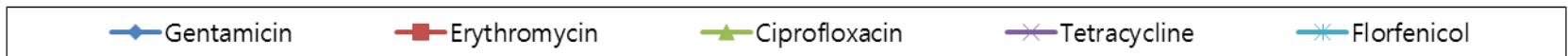
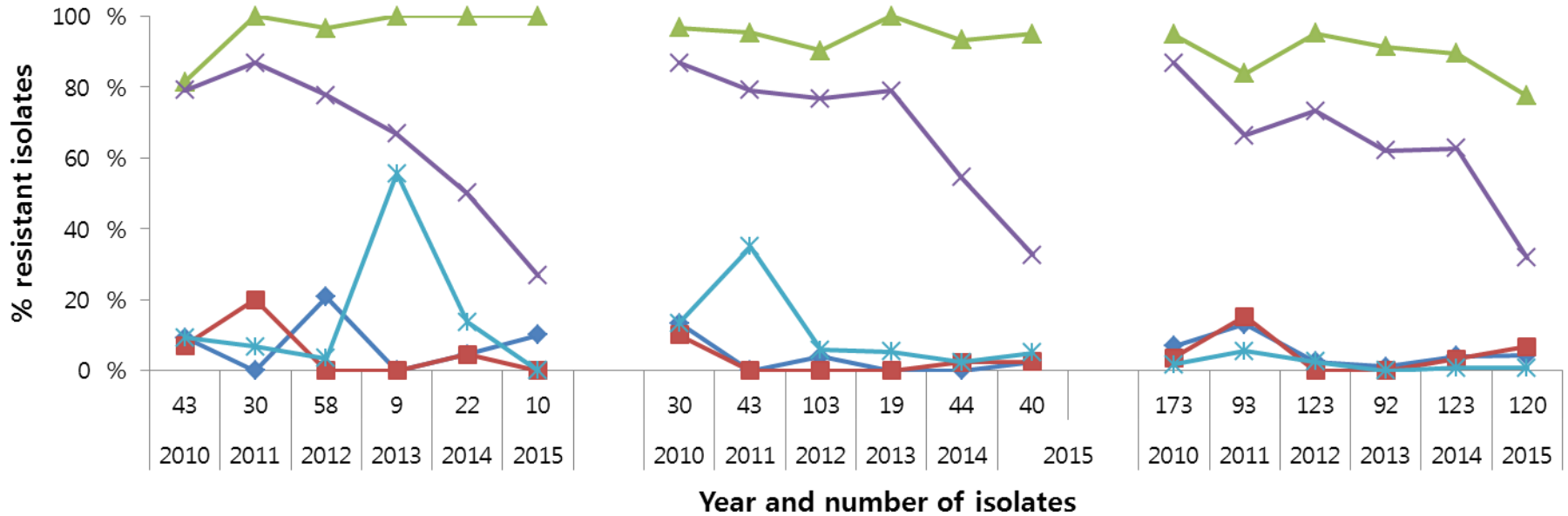
(Source : KFDA)

Antibiotic resistance of *C. jejuni*

Chicken

Chicken carcasses

Humans



(Source : KVARMS 2016, KARMS 2015)

National Action Plan on Antimicrobial Resistance (2016-2020)

National Action Plan on Antimicrobial Resistance

Vision

Decrease the misuse or overuse of antibiotics, use them appropriately, and prevent antibiotic-resistant bacteria transmission

⇒ **Protect citizens from the harm of antimicrobial resistance**

Goals

In humans

- Reduce the antibiotic use by 20%
- Reduce the antibiotic prescription for acute upper respiratory infection by 50%
- Reduce the antibiotic prescription for respiratory diseases by 20%
- Reduce the prevalence of methicillin-resistant *S. aureus* by 20%

In non-humans

- **Double the number of antibiotics needed to be prescribed by veterinarian**
- **Reduce fluoroquinolone-resistant *E. coli* in poultry by 10%**

Six area strategies to achieve the vision

- 1. Use antibiotics appropriately**
- 2. Prevent the spread of antibiotic-resistant bacteria**
- 3. Strengthen the surveillance system**
- 4. Raise awareness**
- 5. Enhance infrastructure and R&D support**
- 6. Accelerate international collaboration**

Detailed action plans in non-humans

1. Use antibiotics appropriately

- Appropriately Use of Antibiotics for Agriculture, Livestock, and Fisheries
: implementation of prescription, sales management , reevaluation of drugs, developed guidelines

2. Prevent the Spread of Antibiotic-Resistant Bacteria

- Prevent the spread of AMR in agriculture, livestock, and fisheries
: Improvement of Breeding Environment , Integrated Information System for Infection Prevention in Fisheries

Detailed action plans in non-humans

3. Strengthen the Surveillance System

- Frame for surveillance : monitoring on duck and pet will be added
- Laboratories : testing capacities for antimicrobial-resistant pathogens will be enhanced, and a national standard laboratory will be established.
- Residue Test : the scope of the national residue program (NRP) on agriculture, livestock, and fisheries products will be expanded

4. Improve Awareness

- Raise awareness of the general public
- Enhance the understanding of antibiotic users (professionals)
- Perform periodical surveys on public understanding on antibiotics

Detailed Action Plans in non-humans

5. Enhance Infrastructure and R&D Support

- Interministerial framework for actions
- Web-based portal system for antibiotics
- Increase strategic investment in R&D for tackling AMR
 - One health concept monitoring on antimicrobial use and resistance
 - Rapid diagnostic test, new antibiotics and alternative therapeutics

6. Accelerate International Collaboration

- Enhance global partnership to combat AMR
- Seek funding opportunities globally

Conclusion

- **The banning of antibiotics in animal feeds was done without major consequences in Korea**
 - No significant impact on decrease of productivity, animal and human health
- **Negative impacts of banning of antibiotics are**
 - Increase of consumption and resistance of therapeutic antibiotics and cost for veterinary and medicine both in pigs and chicken
- **Advance planning should be conducted to create of environment that need for antibiotics**
 - Expanding the environment-friendly farming systems
 - Implementing effective infection prevention and control measures
 - Developing new vaccines associated with outbreaks of animal diseases

Thank you for your attention