

# A pilot survey of farmers' antibiotic use in livestock in Kenya

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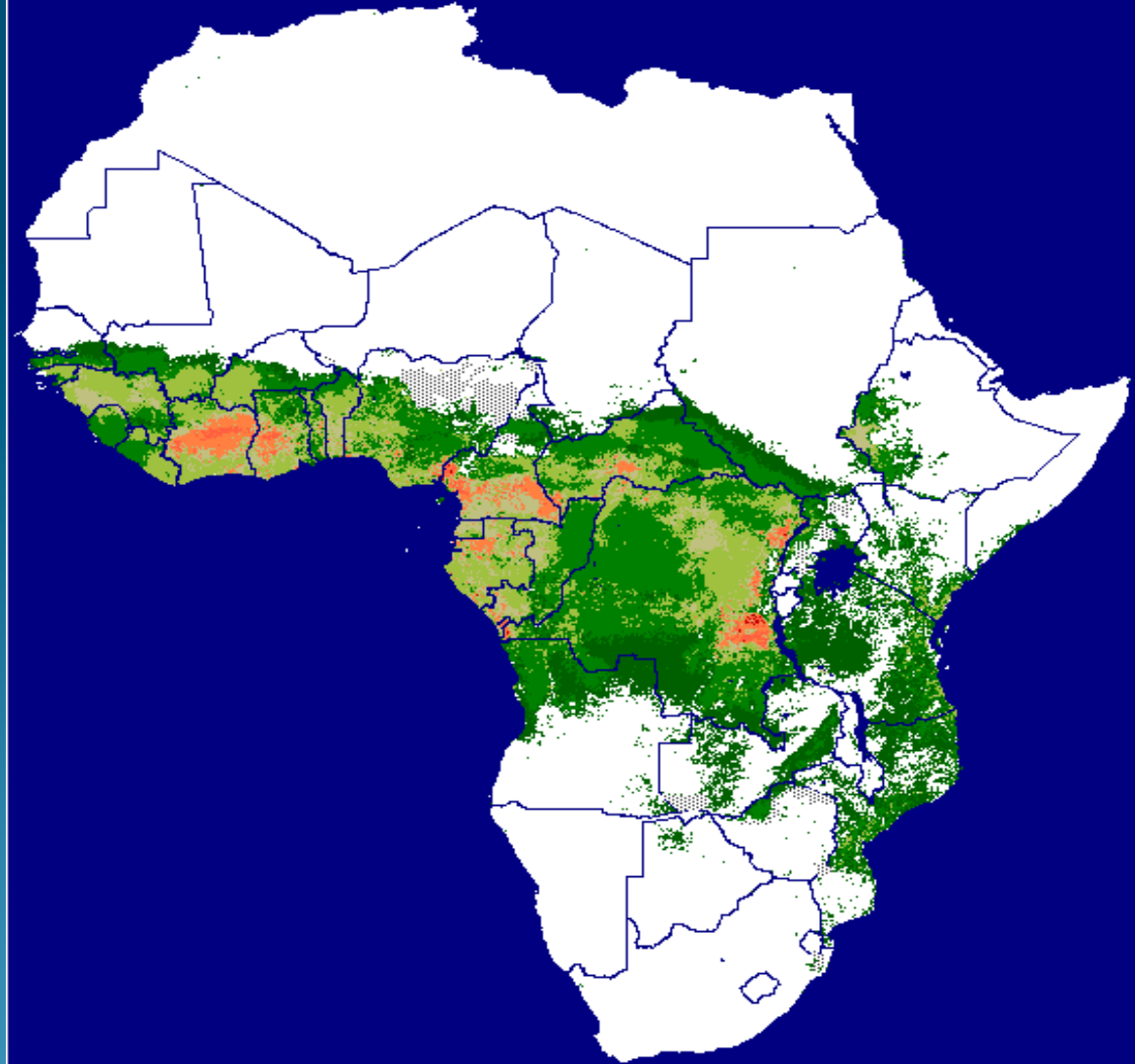
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# Introduction



# Introduction...

- Kenya is endowed with a great variety of AnGR
  - provide food, fibre, economic & social services
  - contribute about 12% of GDP & employ 20% of population
- However, disease is one of the main causes of low livestock productivity
- Necessitate use of non-conventional inputs = **damage abatement inputs** such as **antibiotics**, vaccines, other vet drugs to reduce potential loss of output

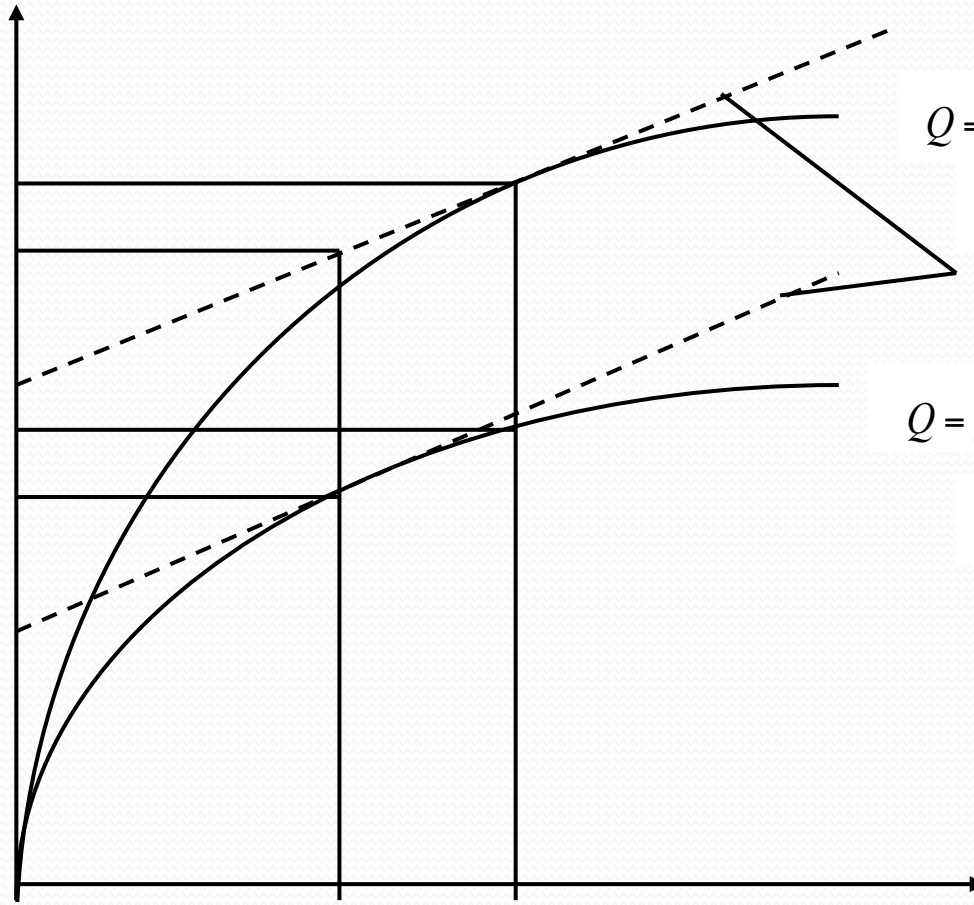
Output  
(Q)

$Q_H$

$Q_L$

$Q_H^D$

$Q_L^D$



$$Q = f(R/\bar{N}, \bar{K})$$

'Healthy'

Budget lines

$$Q = f^D(R/\bar{N}, \bar{K})$$

'Diseased'

$R_L$

$R_H$

Inputs ( $R$ )

# Motivation

- Continuous use DAI – microorganisms get used to them
- Loss of **biological capital** in terms of disease/pest susceptibility – necessitates use of more & more DAI to achieve same result
  - reduces effectiveness or productivity of the input
- w.r.t. antibiotics - increased **selection pressure** for resistant pathogens
- Potential leakage to humans through the **food chain** – difficult to treat infections

# Motivation...

- Do the **benefits** of antibiotics use justify the **social costs** associated with antibiotic resistance?
- Do the farmers understand the magnitude of social cost of antibiotic resistance?
- What **motivates** farmers' use of antibiotics in livestock?
- What is the **correlation** between farmers' antibiotics use and antibiotic resistance patterns?



# Rationale

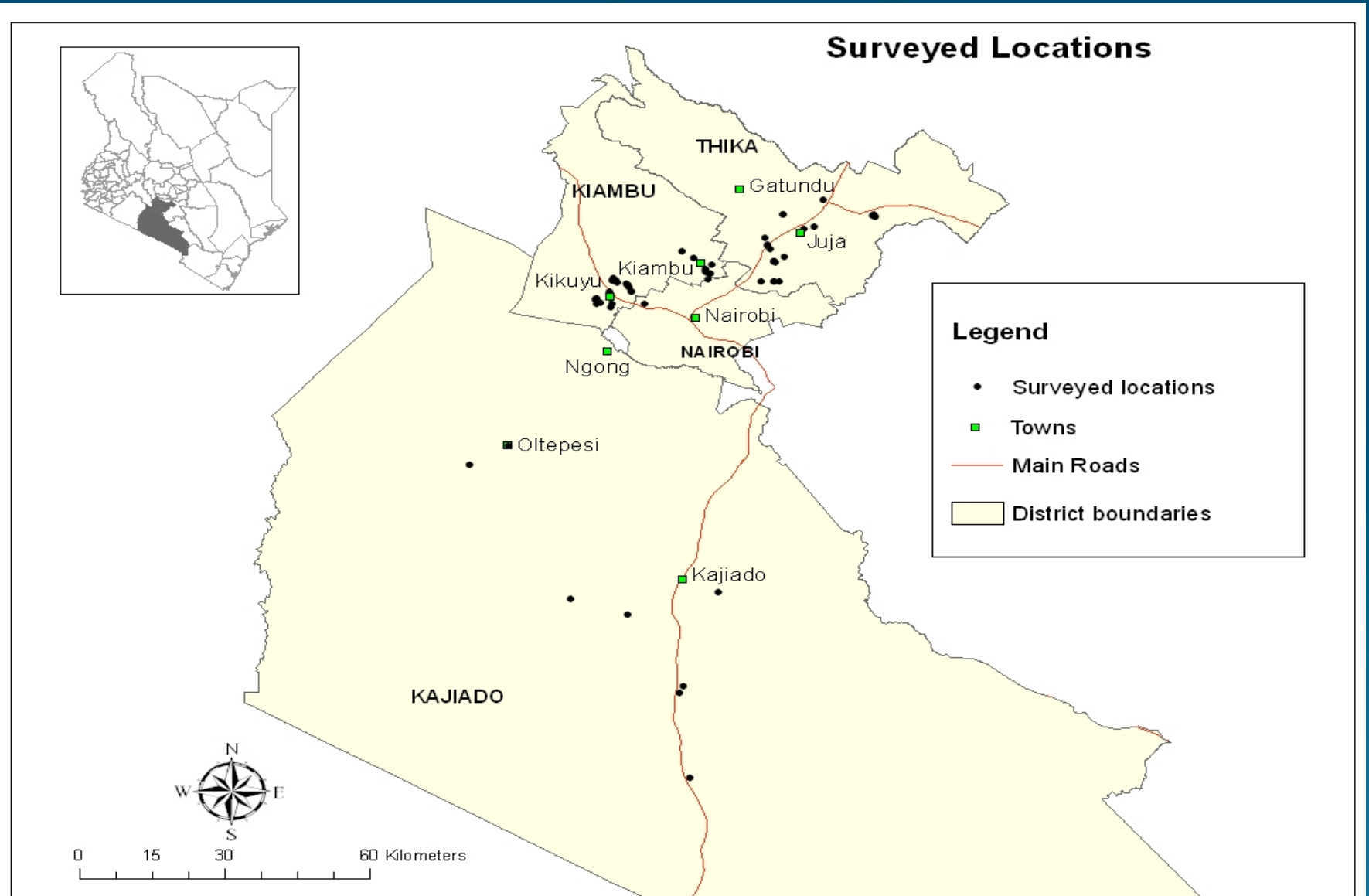
- **Policy** design
  - effective/**rational** drug use
  - minimize potential loss of biological capital - **public good**
- Promotion of livestock **trade**
  - Household incomes/poverty alleviation
  - Forex earnings
  - GDP



# Study design

- Three livestock peri-urban production systems – supply Nairobi with livestock products:
  - Beef cattle – Kajiado District
  - Poultry – Thika & Kiambu Districts
  - Pigs – Thika & Kiambu Districts
- KEMRI collected animal samples for testing for antibiotic resistance
- Purposively selected 20 farmers in each production system assuming they came from the universal set of farmers sampled by KEMRI team
- Questionnaire interviews – Sept/Oct 2010

# Study design



# Results

- 62 farmers interviewed:
- Beef cattle – 20 farmers – all small-scale
- Broilers – 3 farmers – all commercial
- Layers – 18 farmers – 9 SS & 9 commercial
- Pigs – 21 farmers – 13 SS & 8 commercial

# Veterinary drug administration

Drug administrator	n	Percent
Husband	30	49.2
Wife	18	29.5
Farm worker	2	3.3
Veterinarian	7	11.5
Animal Health Assistant (AHA)	4	6.6
<b>Total</b>	<b>61*</b>	<b>100</b>

- **82% of farmers administered drugs without input of veterinary personnel**

# Veterinary drug administration..

Type of training	n	Percent
Seminar	5	55.6
AHA certificate	1	11.1
Diploma in Farm Management	1	11.1
Paravet training	1	11.1
Trained by Kenchic Ltd field technicians	1	11.1
<b>Total</b>	<b>9</b>	<b>100</b>

- **Few of those who administered drugs had necessary training**

# Veterinary drug administration...

Source of knowledge	n	Percent
Experience	23	56.1
Advice from an agroveter operator	9	22.0
Advice from a vet	5	12.2
Advice from other farmers	2	4.9
Advice from an AHA	1	2.4
Trial and error	1	2.4
<b>Total</b>	<b>41</b>	<b>100</b>

- **Most (56%) of the others relied on experience**

# Sources of antibiotics

Production system	Source of antibiotics						Total (n)
	Agroveter	Vet	AHA	Pharmacy	Drug company	Contractor	
Beef cattle	19	1	0	0	0	0	20
Broilers	2	0	0	0	0	1	3
Layers	16	0	0	1	0	1	18
Pigs	11	3	2	2	1	0	19
<b>Total</b>	<b>48</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>60</b>

- **Most (80%) of the farmers relied on agroveter shops**



# Main brands of antibiotics used

Beef cattle	Broilers	Layers	Pigs
Adamcyin	Agracox	Alamycin EB	Penstrep
Oxymet		Tetracyclin	Penicillin
Oxytetracycline			
Penstrep			

• Only Alamycin was used as an egg booster in layers – others used for Rx

# Observance of withdrawal period - products

Milk	Eggs
0.8 days	None

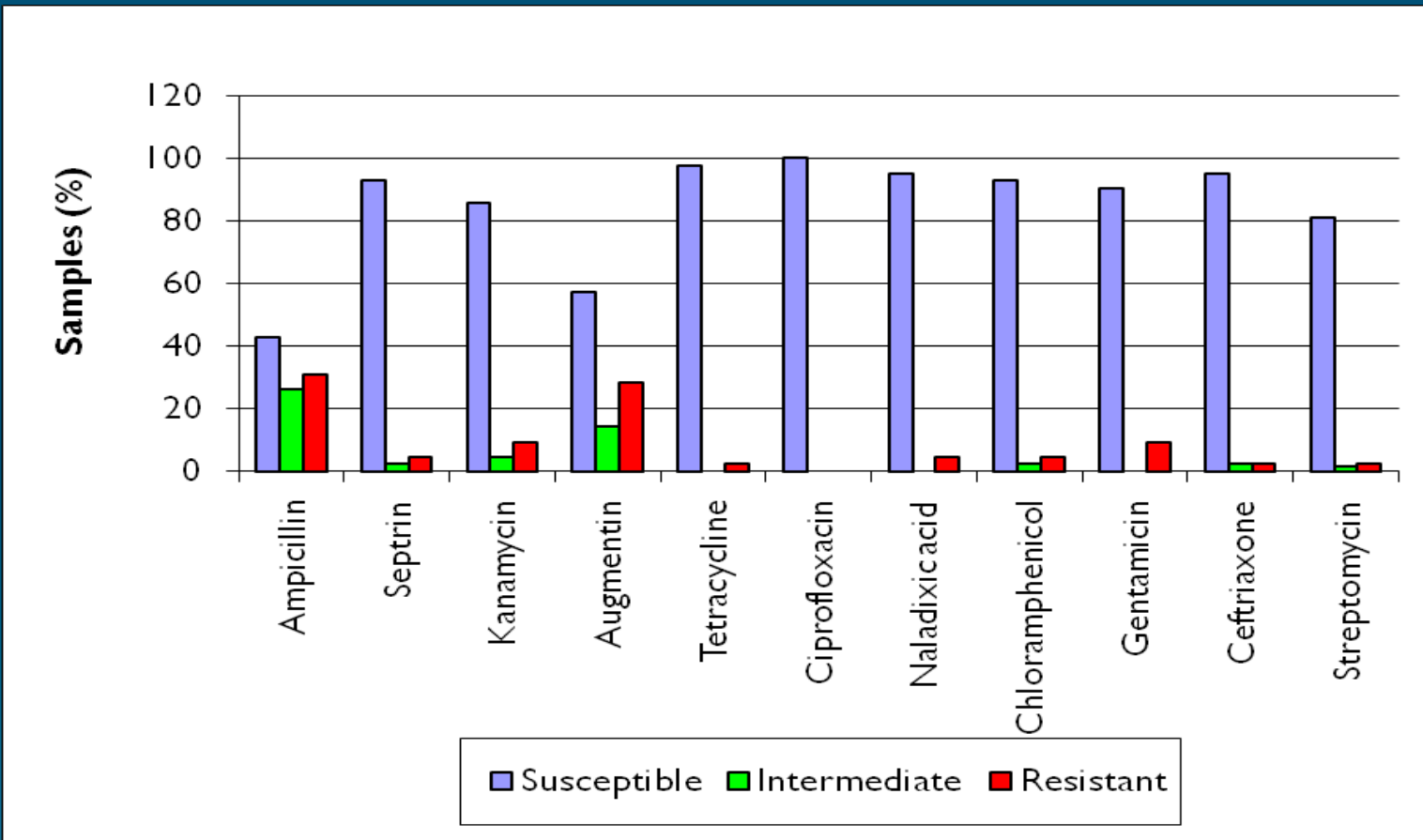
# Observance of withdrawal period – live animals

Action	n
Sell <i>immediately</i> after treatment	24
Observe withdrawal period	17
Wait until animal recovers	7
<b>Total</b>	<b>48</b>

# Lab results

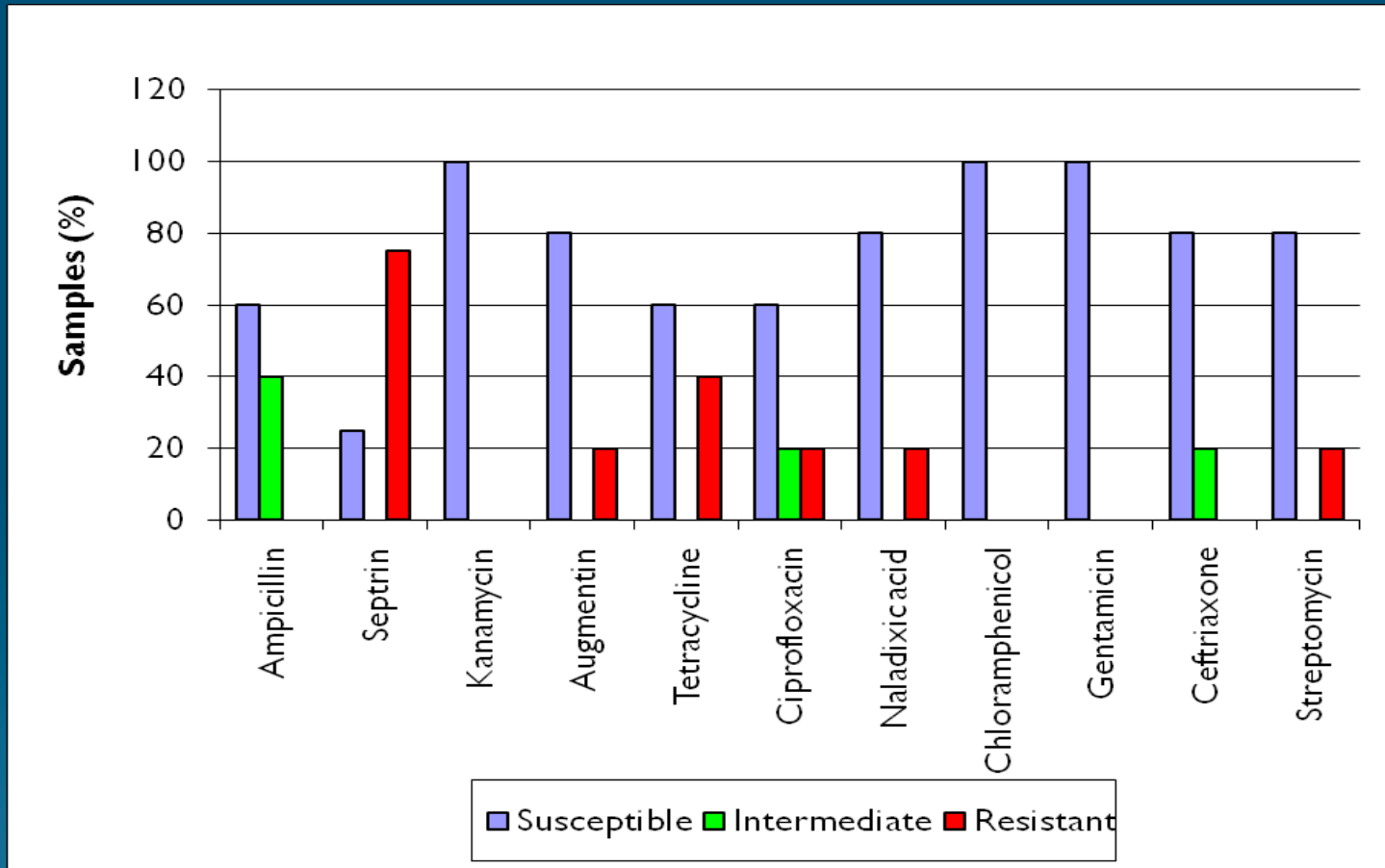
Prd. system	No. of samples	District
Cattle	42	Kajiado
Chicken	5	Kiambu
Pig	8	Kiambu
Chicken	15	Thika
<b>TOTAL</b>	<b>70</b>	

# Lab results...



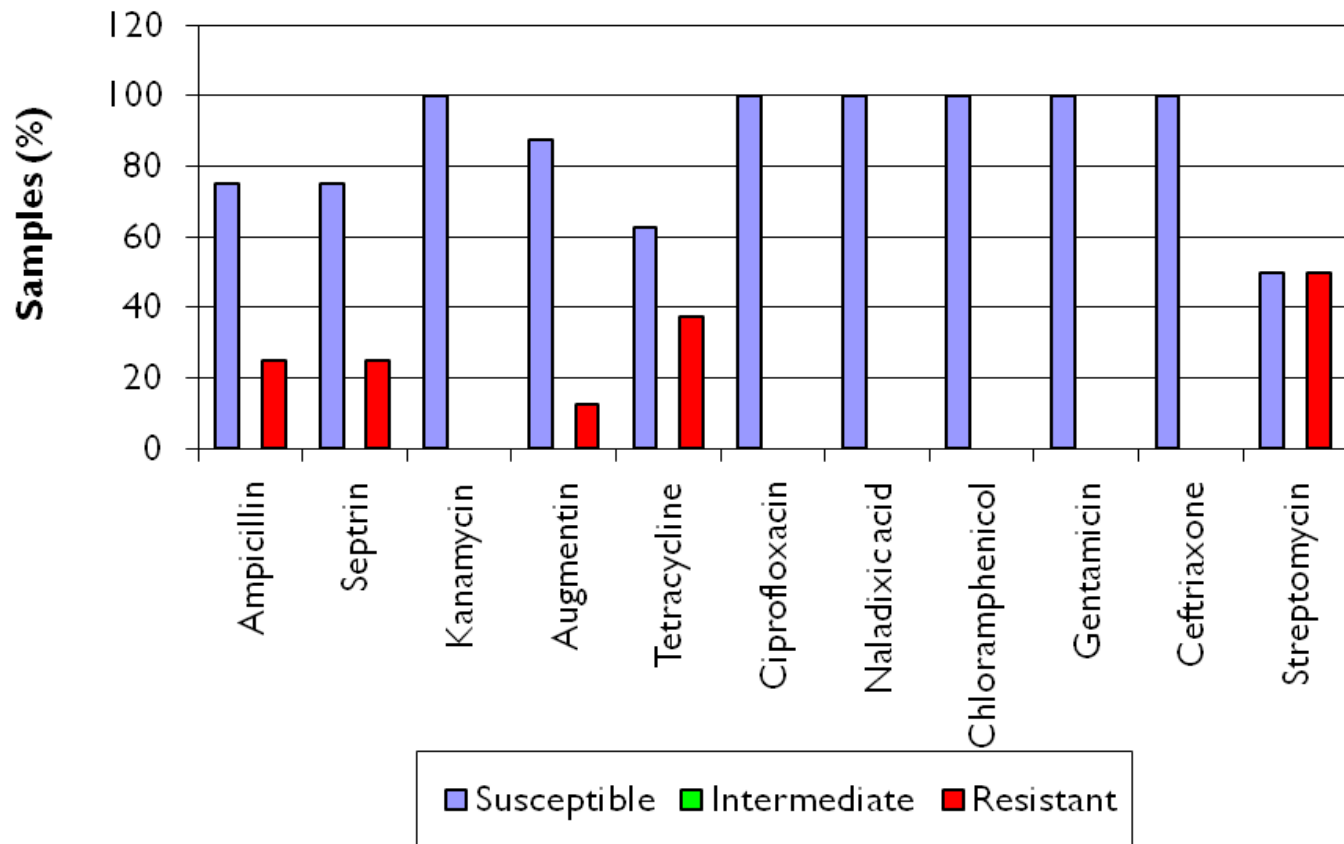
**Kajiado District - cattle, n=42**

# Lab results...



**Kiambu District - chicken, n=5**

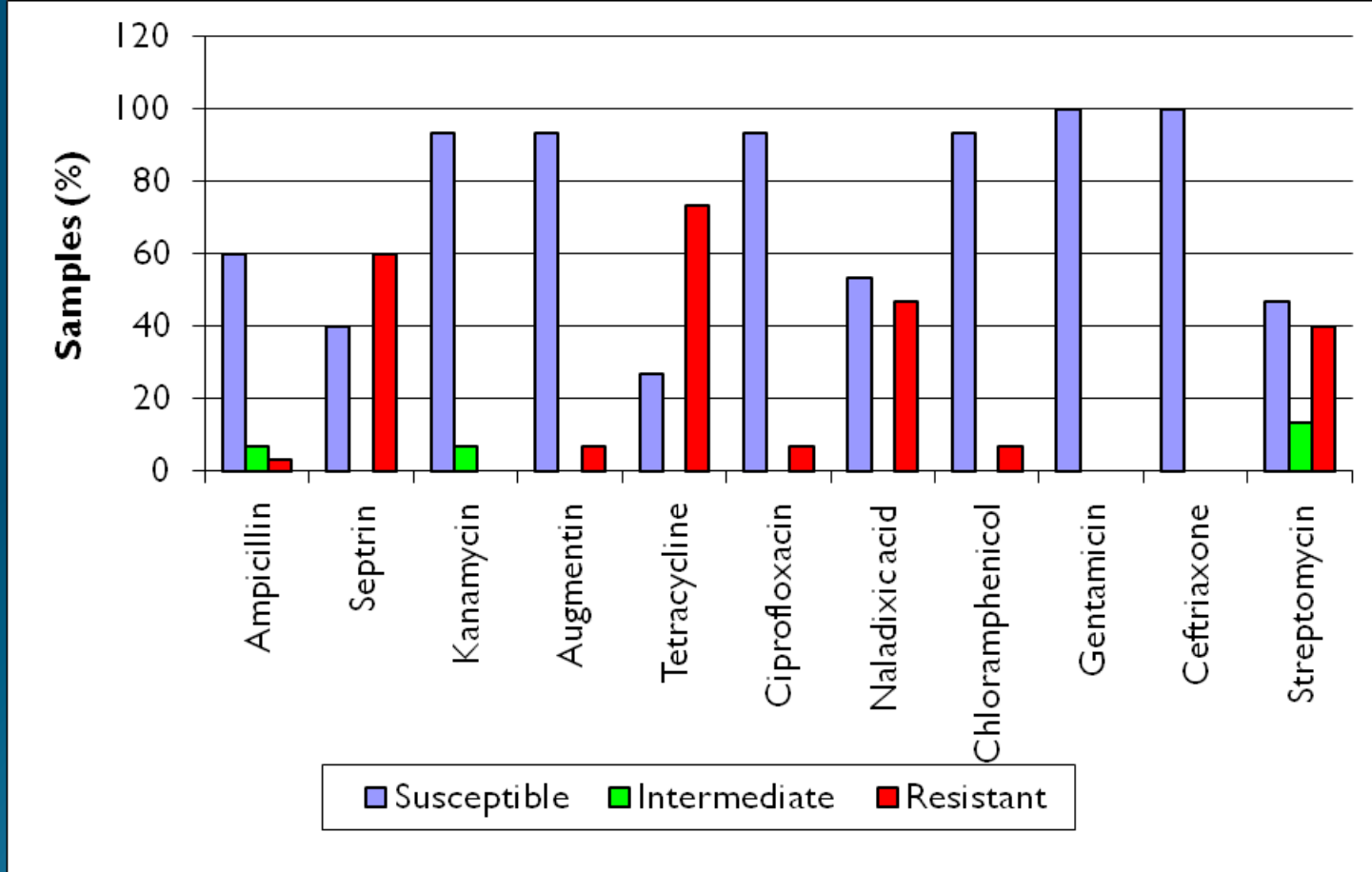
# Lab results...



**Kiambu District - Pigs, n=8**



# Lab results...



**Thika District - Chickens, n=15**

# No. of samples resistant to various classes of antibiotics

Antibiotic	Class of antibiotic	Production system			Total (n=70)
		Beef cattle (n=42)	Chicken (n=20)	Pig (n=8)	
Ampicillin	Penicillin	24	8	2	34
Septrin	Sulfonamide	3	12	2	17
Kanamycin	Streptomycin	6	1	0	7
Augmentin	Penicillin	18	2	1	21
Tetracycline	Tetracycline	1	13	3	17
Ciprofloxacin	Quinolone	0	4	0	4
Naladixic acid	Quinolone	2	8	0	10
Chloramphenicol	Chloramphenicol	3	1	0	4
Gentamicine	Penicillin	4	0	0	4
Ceftriaxone	$\beta$ -lactam	2	1	0	3
Streptomycin	Streptomycin	8	9	4	21

# Antibiotics reported by farmers

Prd. Sys.	Class of antibiotics	Trade name
Beef cattle	Tetracyclines	Oxytetracycline, Oxy-met, Adamycin, Bioxy 50
	Penicillins	Penstrep; Pen & Strep
Chicken	Tetracyclines	Alamycin, Oxytetracycline, Tetracycline, Poultricin, Aliseryl, Agraryl, Egocin, OTC Plus, OTC Dawa, Doxin, Skazon, Limoxin
	Streptomycins	Aliseryl, Agraryl
	Sulfonamides	Sulfadimidin, Sulfa, Miramed, Nilcox, Agracox, Baycox, Medicox
	Quinolones	Quinol-enrofloxacin, Hipralona
	Erythromycins	Miramed, Aliseryl
	Polymyxin/trimethoprim	Colisultrix, Aliseryl
Pig	Penicillins	Penstrep, Penicillin, Betamox
	Tetracyclines	Poultricin, Adamycin, Oxy-furazol
	Sulfonamides	Sulfadimidin, ESB30
	Erythromycins	Tylosin

# No. of samples resistant to various antibiotics

Class of antibiotics	Production system			Total
	Beef cattle	Chicken	Pig	
Penicillins	46	10	3	59
Streptomycins	14	10	4	28
Sulfonamides	3	12	2	17
Tetracyclines	1	13	3	17
Quinolones	2	12	0	14

# Observations

- Livestock farmers widely using antibiotics
- Majority self-administer the drugs without professional input, though they have minimal knowledge on use
  - Potential for misuse & therefore leakage into the food chain
  - Withdrawal period generally not widely observed
- Role of agro-vet as source of antibiotics & information
  - could serve as an entry point for communicating info to influence drug use behavior

# Observations...

- Antibiotics mainly used for curative rather than for prophylactic & growth promotion purposes



# Observations...

- **Beef cattle:**

Streptomycins>sulfonamides>quinolones>tetracyclines

- **Chickens:**

• Tetracyclines>sulfonamides&quinolones>penicillins&streptomycins

- **Pigs:**

Streptomycins>penicillins&tetracyclines>sulfonamides>quinolones

- **OVERALL:**

Penicillins>streptomycins>sulfonamides&tetracyclines>quinolones



# Conclusion

- Widespread & intensive use of Abs in Kenya
- Resistance is widespread in all production systems, particularly in cattle & chicken PS
- Indiscriminate use of ABs – cattle PS
- Self-administration of vet drugs
- Unethical practice – maladministration & withdrawal period not widely observed
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# Further studies

- FAO-funded expanded study on AMR – more districts
- Can changes in AB & livestock product prices alter AB use in livestock?
- What is farmers' knowledge, attitude & beliefs towards AB use?



# Acknowledgements

- CCDEP/GARP – funding
- KEMRI
- Livestock farmers

**Thank you**