

Animal welfare and food safety in Africa: Case study of live bird markets in Accra, Ghana

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Outline

- Introduction
- Live Bird Markets
- Food safety issues with poultry
- Observations of our study
- Conclusion



Introduction: Animal source foods and food safety

- Animal source foods are highly nutritious
- They are reservoirs of zoonotic pathogens
- Good animal welfare strategies in poultry production systems could augment food safety efforts upstream of the value chain.
- It is unethical to cause intentional pain to animals
- Animal welfare is a priority for OIE



Live Bird Markets

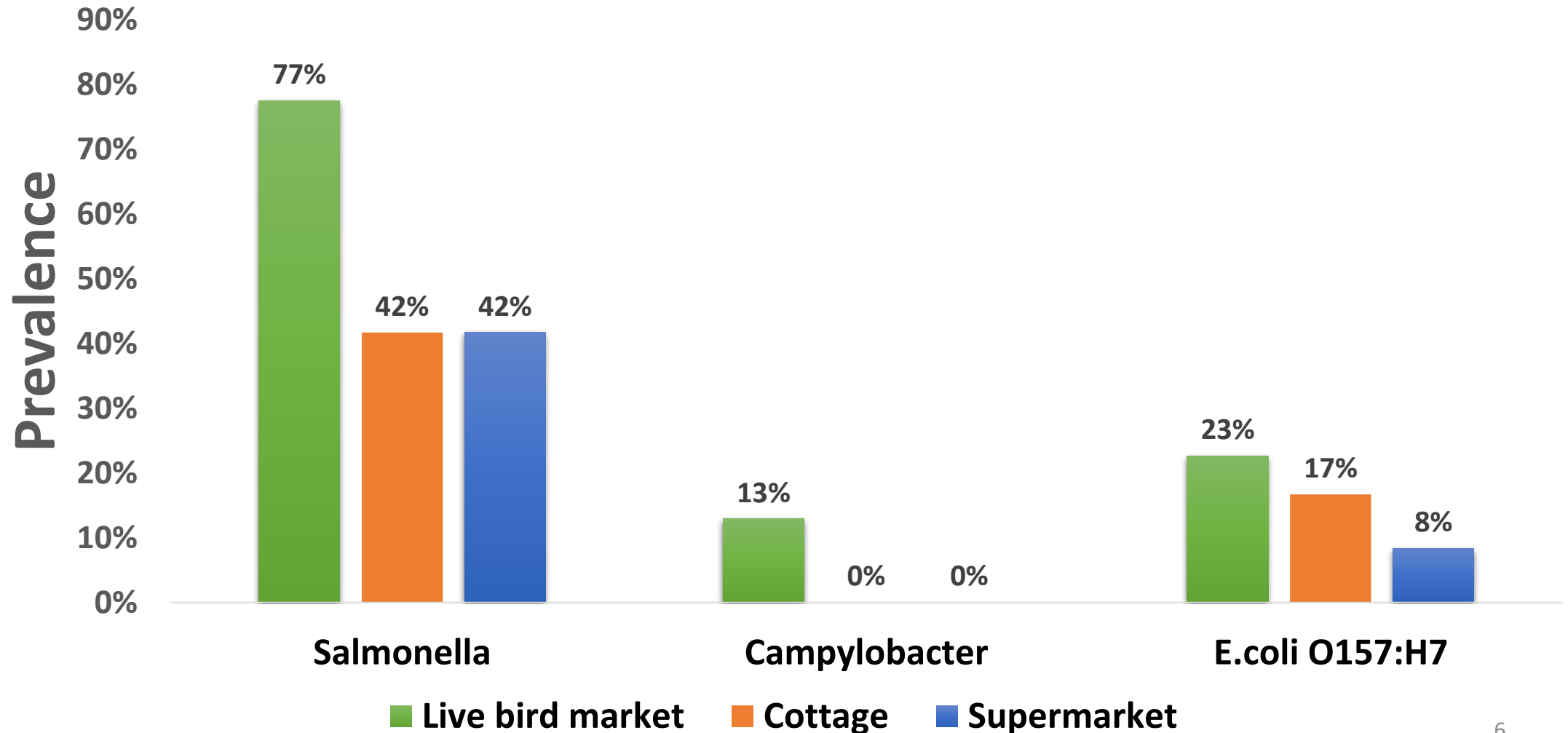
- Street food operations in traditional markets
- Trade of live poultry, mainly chicken but also guinea fowls, turkeys, doves, pigeons and ducks.
- Poultry sourced from both commercial (industrial/large scale, medium scale and small scale) and village/backyard systems of raising poultry.
- Slaughter and dress birds for clients on demand
- Operations are manual
- Niche market for local poultry products



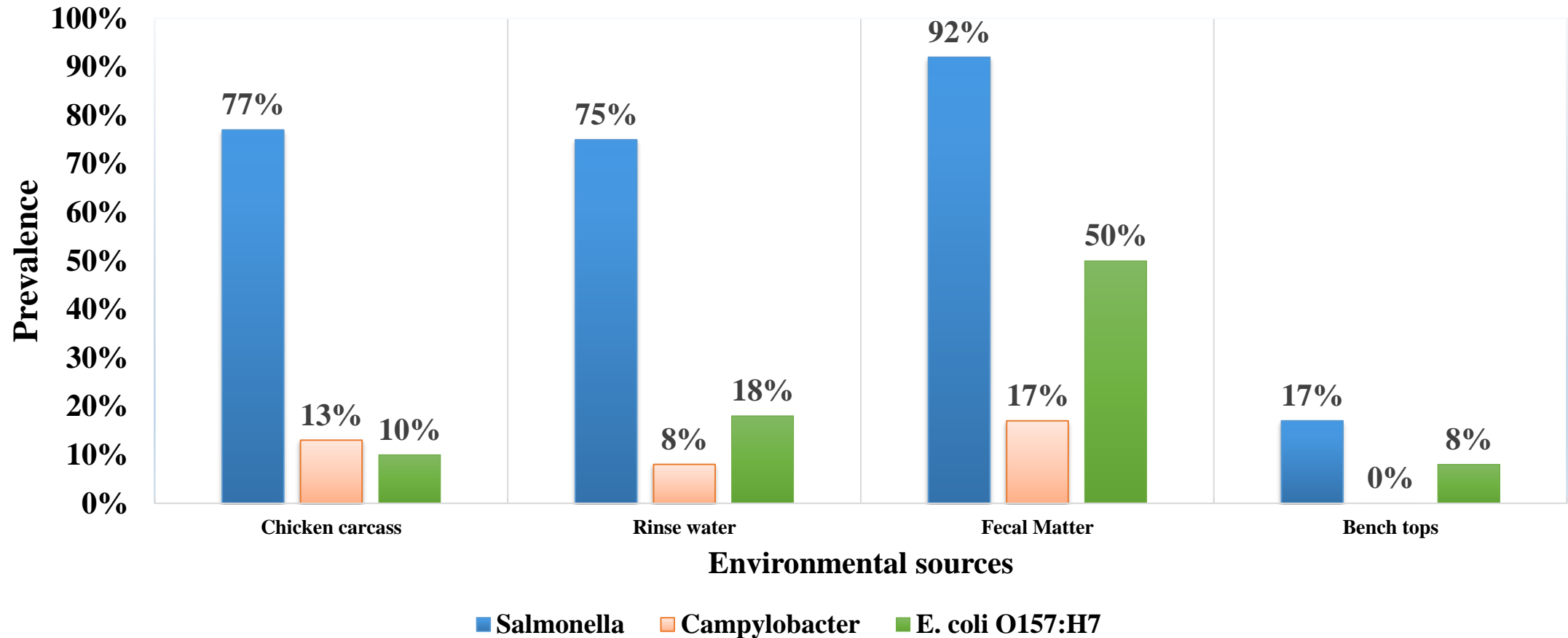
Food safety issues with poultry

- Poultry consumption has increased in the past decade with corresponding increase in Salmonella and Campylobacter infections
- Globally, poultry is considered an important pathogen exposure pathway
- Salmonella and Campylobacter cause intestinal inflammation and possible complications in immunocompromised persons
- Emergence of multi-drug resistance increases public health risk of these zoonotic pathogens
- Poultry systems are believed to contribute significantly to antibiotic resistance

Prevalence of pathogenic bacteria on raw chicken meat from different outlets in Accra (Parry-Hanson Kunadu et al., 2020)



Prevalence of pathogenic microorganisms on chicken carcasses and poultry environment from LBM in Accra, Ghana (Parry-Hanson Kunadu et al., 2020)

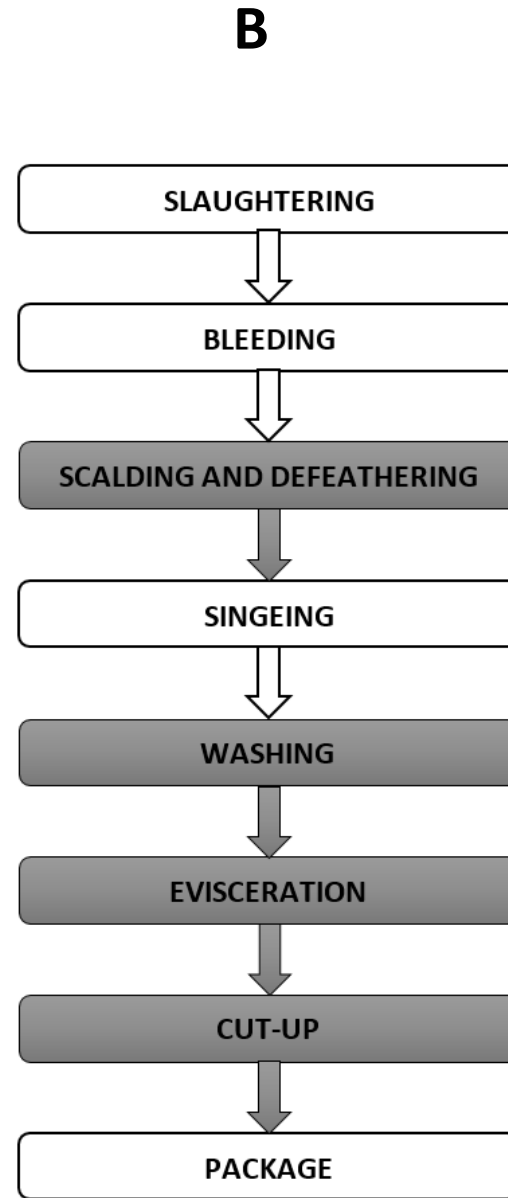
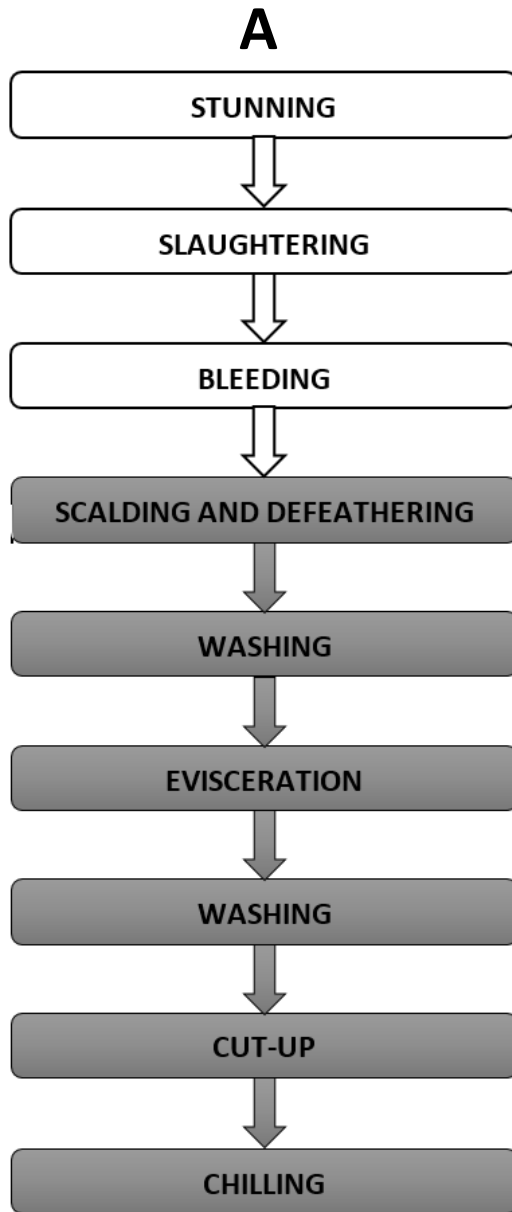


Sources of *Salmonella* serovars identified in poultry environments in Accra (Parry-Hanson Kunadu et al., 2020)

<i>Salmonella</i> <i>enterica</i> Serovars	Prevalence (%)			
	Chicken carcasses	Faecal matter	Rinse water	Bench surface
S. Typhimurium	36	21	43	-
S. Paratyphi B	100	-	-	-
S. Agona	25	50	25	-
S. Infantis	10	70	20	-
S. Newport	50	13	25	13
S. Mississippi	100	-	-	-
S. Seftenberg	-	-	67	33
S. Adelaide	-	100	-	-
S. Enteritidis	11	33	44	11
S. Westhampton	-	-	100	-
Unidentified	-	100	-	-
<i>Salmonella</i> spp				

Food safety practices of LBM operators that should be improved (Ovai et al., 2019)





● Critical control points

Process flow diagram of standard poultry processing operations (A) compared to a summary of field observations of raw chicken processing operations in Accra (B)

Ovai et al., 2019

Catching and handling of birds

- Correct catching and handling ensures safety of the bird and the handler
- Rough techniques will result in panic of the birds
- Approach birds quietly and calmly
- Free range birds could be caught with fishing nets
- Birds should be placed singly in cages with head first

Reference: www.hsa.org.uk



Poultry birds transported in plastic cages



Side view of a truck transporting chickens in plastic cages

- Birds may be transported in plastic cages with adequate ventilation
- Transportation should be done when the weather is cool to reduce exposure to heat stress (preferably at night)
- Darkness and cool weather at night keeps the birds calm and minimizes agitation during transportation
- Food should be withheld from birds during transportation

Transportation of Poultry birds at LBM



- LBM purchased birds from all scales of poultry farms
- Some use plastic cages, others use wire mesh cages

Slaughter process

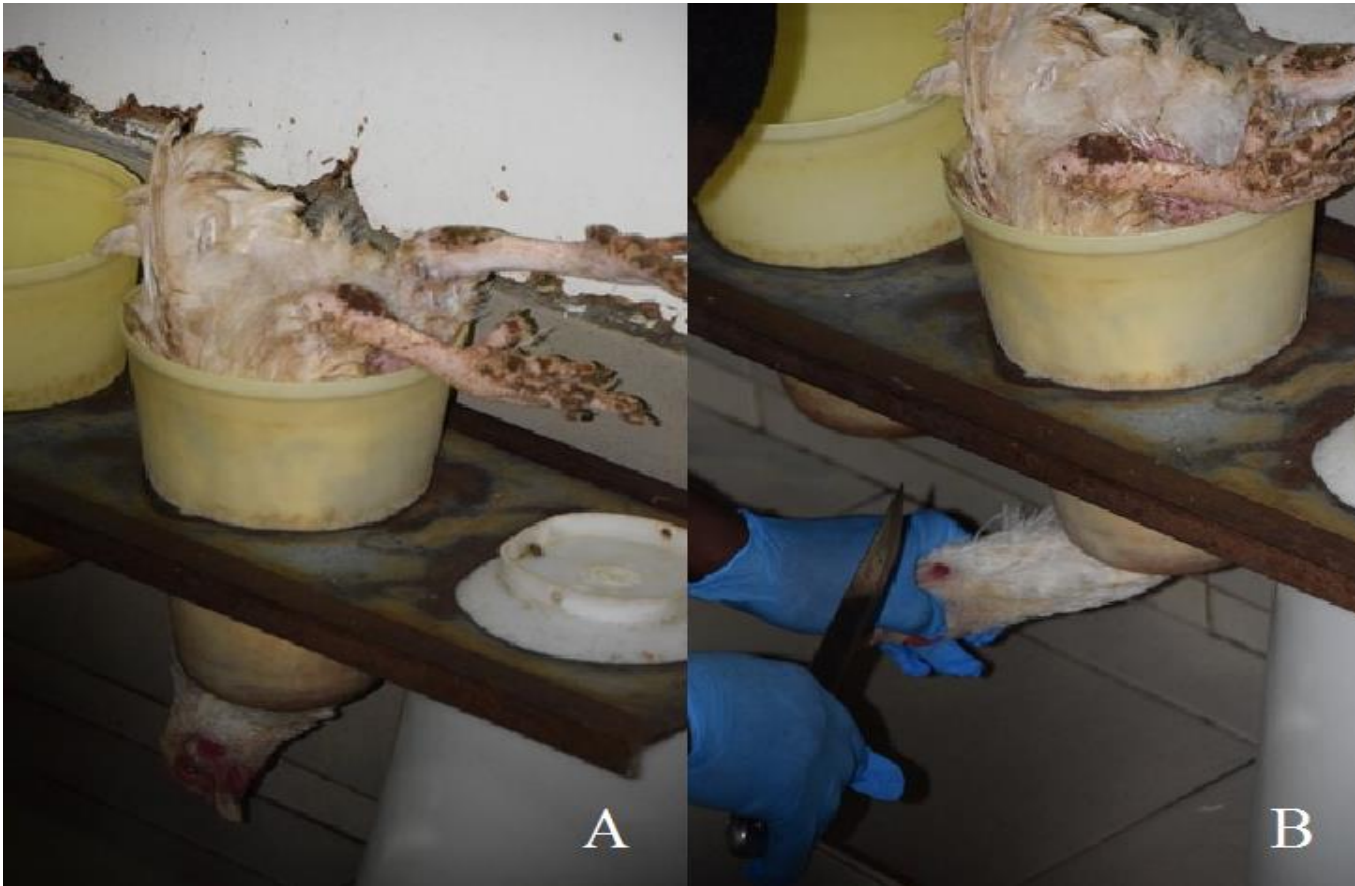
- 2 step process:
 - i. loss of consciousness and
 - ii. slaughter
- Cone commonly used for restraint
- Minimize time in restraint (Max 1 minute)
- Maintain hand contact with bird during first few seconds in restraint to calm the bird
- Electrical current is typically used for stunning birds to ensure that they remain unconscious until birds die.

Reference: www.hsa.org.uk



Image: HSA www.hsa.org.uk

Slaughter process



A) A bird inverted in a cone, ready for slaughter

B) The same bird just before blood vessels in its neck are severed

The cones are used to hold birds in an inverted position prior to slaughter.

Cone sizes should be appropriate for the size of the birds; not too small, not too big

Need to have access to potable water and a heating system for scalding and defeathering.

Need containers for water storage and washing of defeathered birds

Slaughter process at LBM in Accra



Restraining



Slaughter



Bleeding

Dressing of birds at LBMs in Accra



Scalding



Defeathering



Singeing

Hygiene of slaughter and dressing of poultry

- Poultry Slaughter facilities should have PRPs.
- This includes structural, organizational and personnel hygiene
- Slaughtered poultry should be chilled asap to $\leq 4^{\circ}\text{C}$
- Environment must be clean and disinfected regularly
- Equipment and food contact surfaces but be cleanable
- Training and skill required for CCPs (E.g. evisceration)
- Use of SOPs

Food safety risk factors challenges at LBMs in Accra

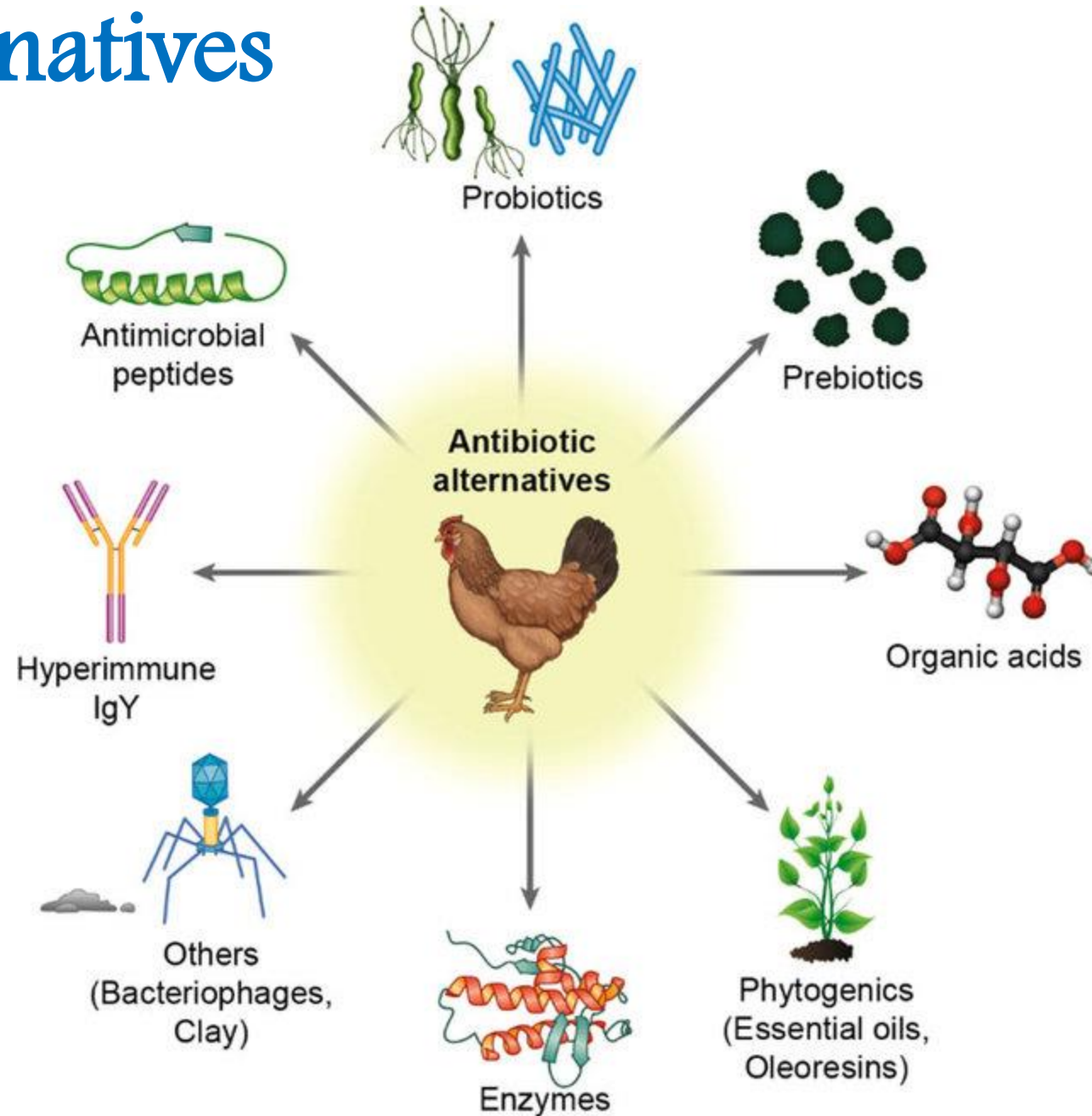
- Limited infrastructure
- Some food contact surfaces are not cleanable; others indicate long use without cleaning
- Water is a scarce commodity
- Feed withdrawal prior to slaughter is rare
- Variations in operational steps depending on who and where operations are done
- Many actors have good intentions but are ill informed
- Some practices such as feed withdrawal, changing of litter, singeing and chilling are sometimes impractical for LBMs
- **Water dosed daily with antibiotics**



Multidrug resistant *Salmonella* serotypes isolated from poultry environments in Accra, Ghana (Parry-Hanson Kunadu et al., 2020)

<i>Salmonella</i>		Multi-drug resistance within each serovar			
Serovars (n)	(≤3) antibiotics	(3-4) antibiotics	(5-6) antibiotics	(7-9) antibiotics	
Adelaide (1)	-	-	1	-	
Agona (4)	-	-	3	1	
Enteritidis (9)	-	1	4	4	
Infantis (10)	2	1	7	-	
Mississippi (1)	-	1	-	-	
Newport (8)	1	1	1	5	
Paratyhi B (2)	-	-	1	1	
Senftenberg (3)	-	1	2	-	
Typhimurium (14)	1	3	4	6	
Westhampton (1)	-	-	1	-	
Unidentified	-	-	1	1	
<i>Salmonella</i> spp. (2)					
Total	4	8	25	18	

Antibiotic alternatives



Gadde et al., 2017

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Conclusions

- Several challenges exist in implementing animal welfare strategies within live bird markets in Accra with corresponding implications for food safety.
- Some alternatives to antibiotics are expensive for LBM operations and their clients.
- There is the need to explore other green alternatives that are affordable and scalable in the LBM model.

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