

Quality assurance and control of poultry feed to ensure food safety



Dr. sc. agr. Kai – J. Kühlmann

World Poultry Science Association – Bangladesh Chapter

Dhaka, April 21, 2018



Agricultural market trends

1

Overview

Goals

- Global animal production quadrupled during the past 50 years → 320 million MT of meat (2016)
- World's population is to increase to 9.6 billion by 2050
- Increasing urbanization
- Asia → leading responsibility to decrease world hunger
- Global food production needs to increase by 70%
- 300 billion MT of cereal production
- 470 Million MT of meat

Reality

- Annual growth rates of cereals
- Challenge of new technology development competing with natural resources, climate change and habitat preservation
- Intensified trade of feed raw materials and agricultural consumer products
- Political will → professional communication → networking

Farmer need to produce more feed from less lands with fewer hands

FAO goal: produce more safe food for animals

1

Overview



Despite all global challenges

Humanity needs to produce more food in the next 33 years than it has been in the past 8,000 years

Macro trends lead to three specific key customer needs

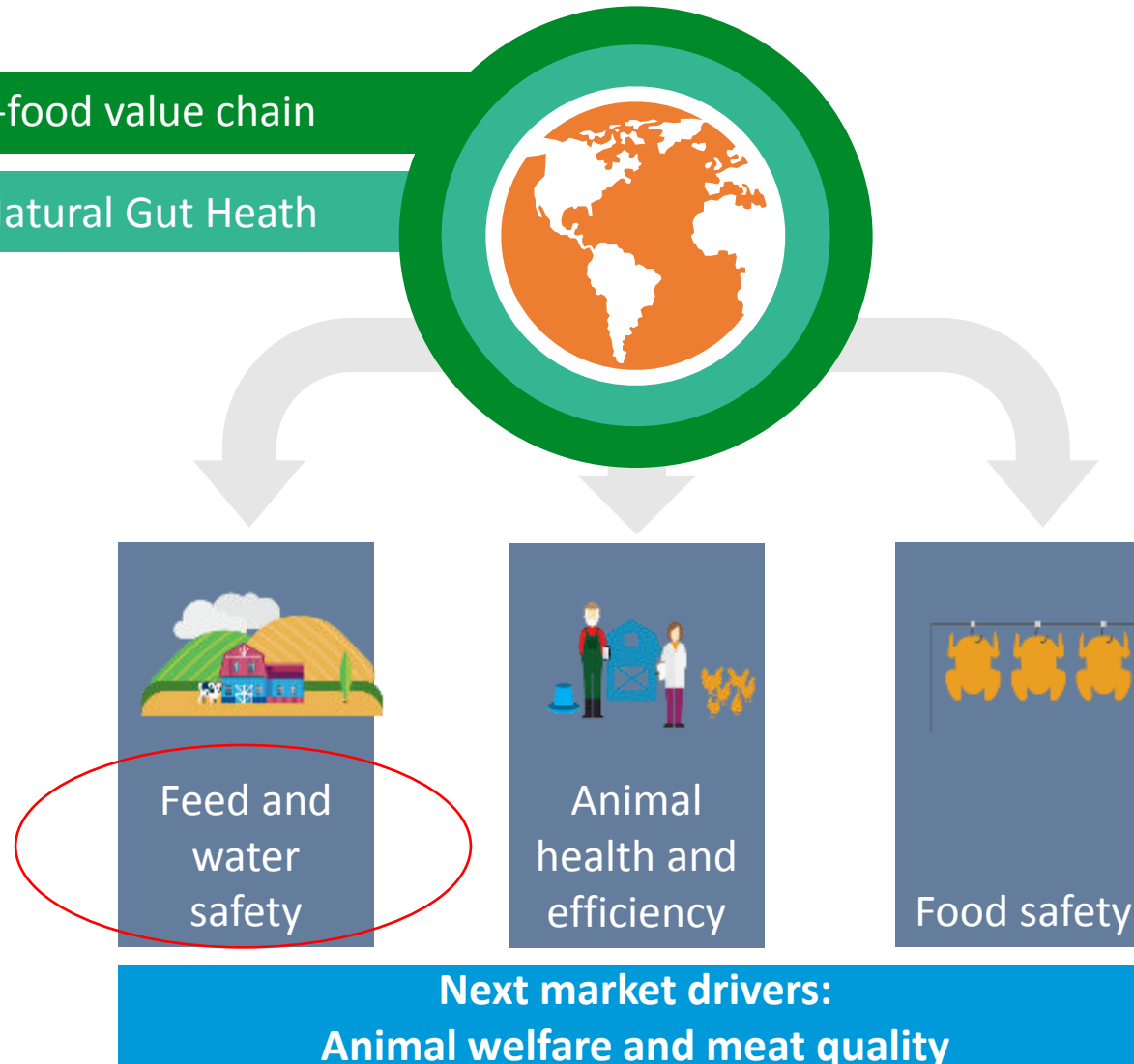
1

Overview

Antibiotic reduction and sustainability are overriding trends in value chain

Sustainability in feed-food value chain

AMR prevention by Natural Gut Health



Why we need improved feed safety management?

FEFAC

2

Challenge & Objective



- **Climate change** will effect the changing risk profile of feed and raw materials



- **Legislation** on feed to food safety → demand for new technologies



- **Social media transparency** leads to compliance to 0-tolerance policy by more accurate laboratory analysis



- The need **to reduce waste** of resources in harvested crops



Global feed waste: post-harvest & processing

2

Challenge & Objective

Region	Cereal production (Mill ton)	Feed waste (%) Before consumption	Process waste (Mill ton)
Europe	400	11	44
North America	500	10	50
Latin America	190	16	30
North Africa	100	20	20
Sub-Sahara Africa	100	18	18
Asia, India	490	17	83
Southeast Asia	610	17	104
Total	2390	Avg. 15.6	349 (14.6%)



After global cereal production:

- 15% go to waste during feed raw material storage and feed processing
- 15% go to waste before feed consumption by animals

Impacts of pathogen bacteria

2

Challenge & Objective

Diarrheal diseases

- 2005 1.8 million people died from diarrheal diseases worldwide

Salmonellosis

- 2009 in 79% of all tested water samples *Salmonella* was found (USA)
- 2011 1 mill people affected in the USA (19,000 hospitalizations; 370 deaths)
- 2014 91,000 people affected in the EU

Enterohemorrhagic E. coli

- 1996 6,000 children affected in a single outbreak → 2 deaths
- 2011 3,250 people affected in Germany → 49 deaths

Campylobacter

- 2014 214,000 people affected in the EU

Dennis 2004; WHO, 2005; World Poultry 2011; RKI 2011; EFSA 2014



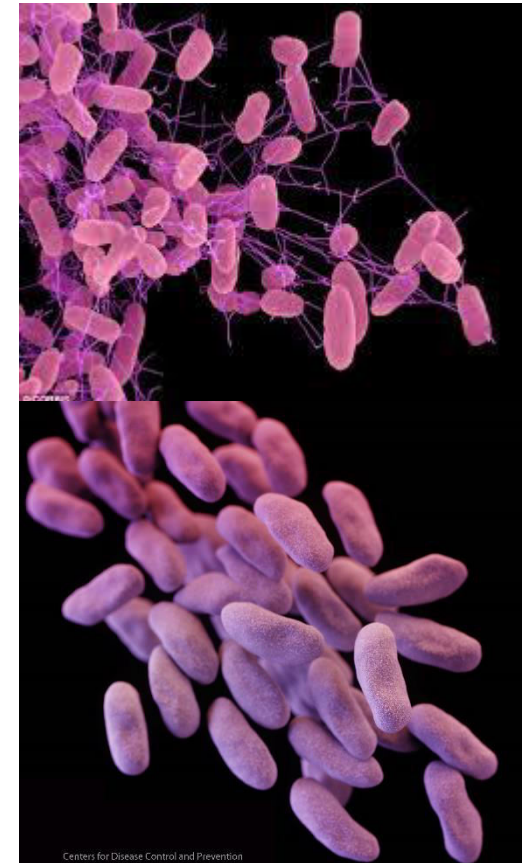
Pathogenic bacteria in meat

2

Challenge & Objective

Pigs		Poultry		Feed	
n Isolates	4504		5888		599
%					
S. typhimurium	47,3	S. Enteritidis	37,6	S. Mbandaka	12,9
S. derby	10,8	S. Typhimurium	7,2	S. Senftenberg	10,7
S. rissen	3,6	S. Infantis	6,3	S. Agona	8,3
S. enteritidis	2,8	S. Virchow	3,1	S. Lexington	6,5
S. Infantis	1,8	S. Mbandaka	2,2	S. Infantis	4,7
S. London	1,6	S. Senftenberg	1,7	S. Typhimurium	3,2
S. Anatum	1,3	S. Bredeney	1,4	S. Livingstone	3,2
Other Serovars	22,8	Other Serovars	29,6	Other Serovars	33,1

(EFSA 2007; EFSA 2009)



Centers for Disease Control and Prevention

Agricultural challenges in the tropics

2

Challenge & Objective

Tropical humid & hot climate



Intensive farming



- feed raw material storage conditions
- High bacteria density → high infectious diseases
- High animal growth performance (poikilotherm organisms)
- High stress for homiotherm animals (chicken) → panting



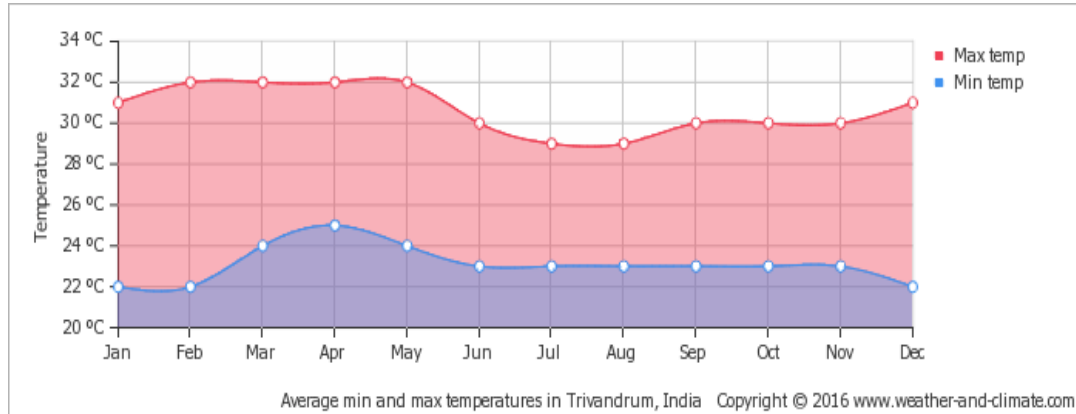
- Challenge to build best rearing facilities as animals can't escape
- Best housing, feeding, farm biosecurity conditions

Rain – the mold challenge in feed raw materials

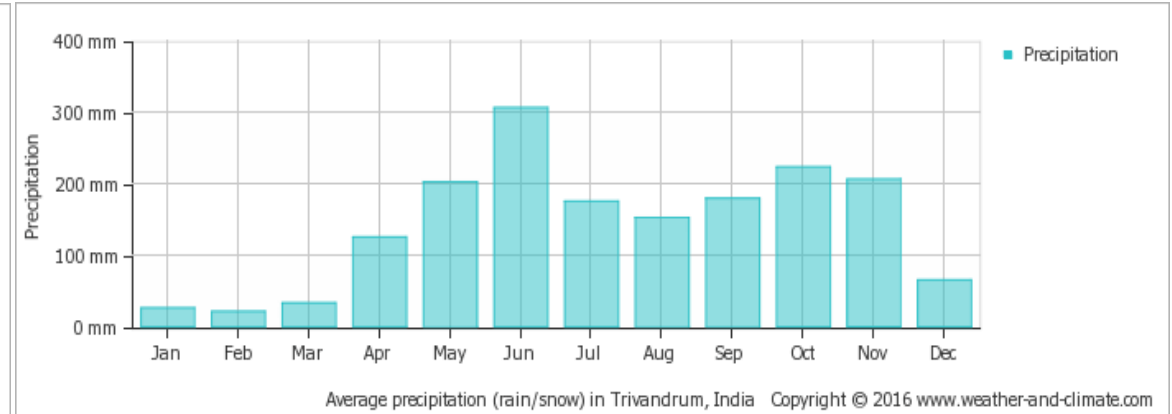
2

Challenge & Objective

- Tropical typhoon climate with wet and dry season
- Above 32°C year round with up to $>3\text{m}^3/\text{m}^2/\text{year}$ of rain



Annual min/max temperature 2016



Annual rain fall 2016

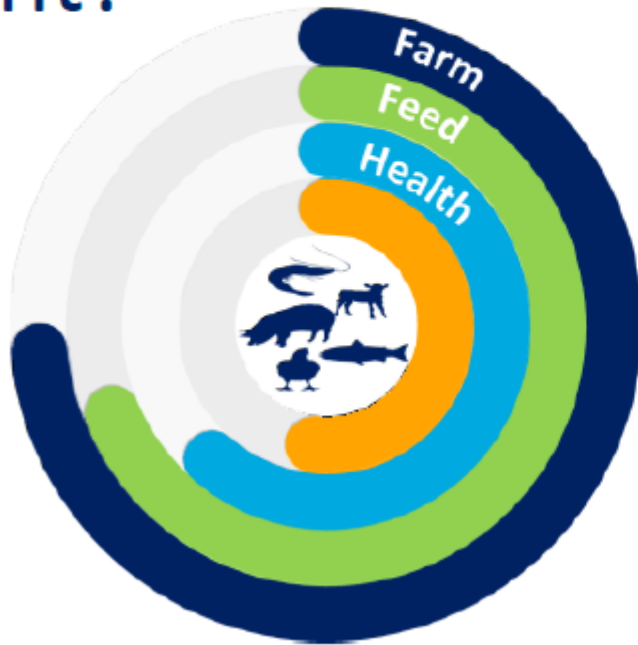


Customer needs to best feed quality

2

Challenge & Objective

What
customers
want?



**PRODUCTS-
SERVICES**

Vs.

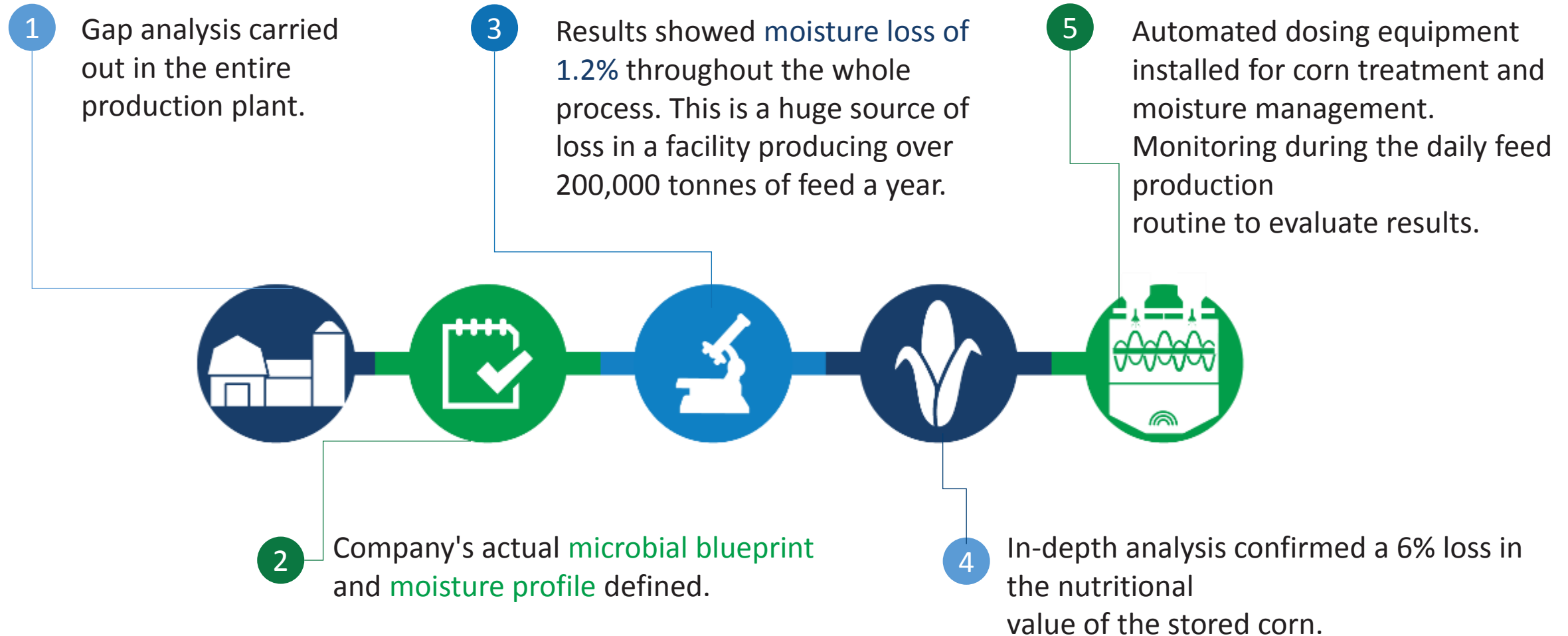


**INTEGRATED
SOLUTIONS =**
offered by a
specific
Programme

Identify key issues & start creating value

3

Gap analysis



A tool for feed to food quality and safety

3

Gap analysis



Certified Quality & Food Safety: (HACCP / HSEQ, UFAS) → customers can check operations and certificates



Ingredient & Supplier Assessment and Management: Only use quality standard approved feed ingredients and suppliers based on risk assessment standards



Monitoring & Control: Standardized sampling & analysis methods combined with an early warning and rapid alert system



Risk Management: issue and crisis management system to minimize risks and their impacts, supported by a global network of industrial stakeholders



Tracking & Tracing: keeping records of every input and process from feed ingredient purchase to finished feed delivery

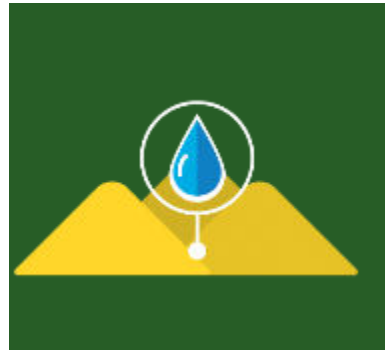
Feed Safety & Feed Mill Efficiency for business profitability

3

Gap analysis



**Avoid Entero-
bacteria
contamination
in raw material
and final feed**



**Optimize
moisture
profile
of final feed**



**Increase
pelletizer
throughput
per hour**



**Protect shelf
life of raw
material
and final feed**



**Preserve
nutritional value
in final feed**

Sampling – Feed raw materials

3

Gap analysis

Incoming Area	Sample No.
Maize (local)	1
Meat bone meal	2
De-oiled Rice bran	3
Rice polish	4
Maize gluten meal	5
Soybean meal (India)	6
Fishmeal (India)	7
Maize silo dust collector	17



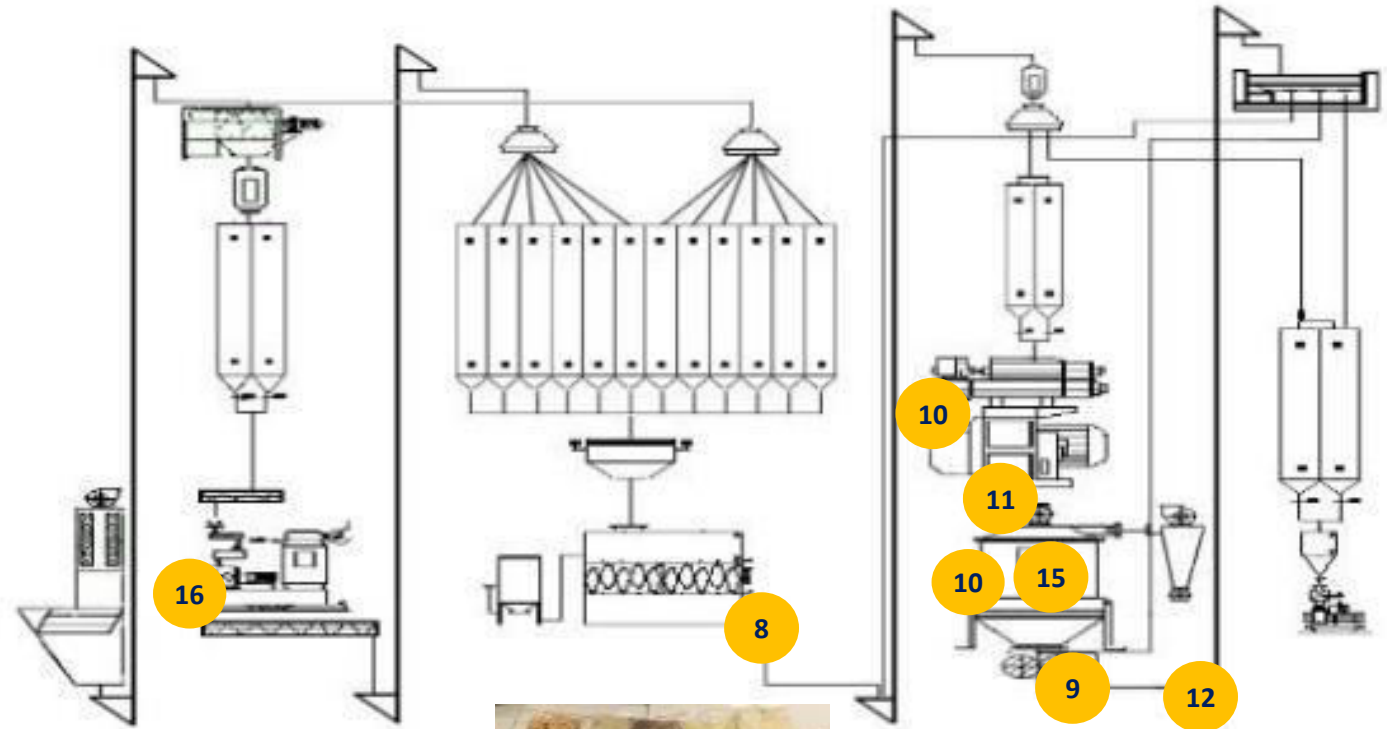
Feed raw material storage area

Sampling – Feed production

3

Gap analysis

Processing Area	Sample No.
After mixer	8
After cooler	9
After conditioner	10
After pelletizer	11
Pellet Feed, bagging	12
Inside cooler	15
Hammer mill	16



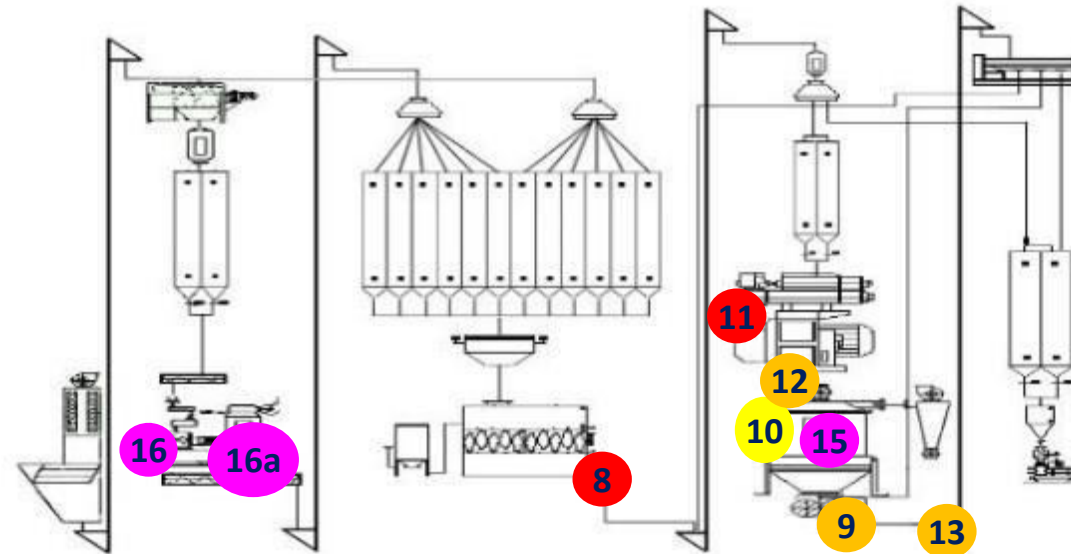
Samples collected

Results – Feed production

3

Gap analysis

Processing Area	Sample No.
After mixer	8
After cooler	9
Cooler swab	10
After conditioner	11
After pelletizer	12
Pellet Feed, bagging	13
Mash Feed, bagging	14
Inside cooler	15
Hammer mill	16
Hammer mill swab	16 a



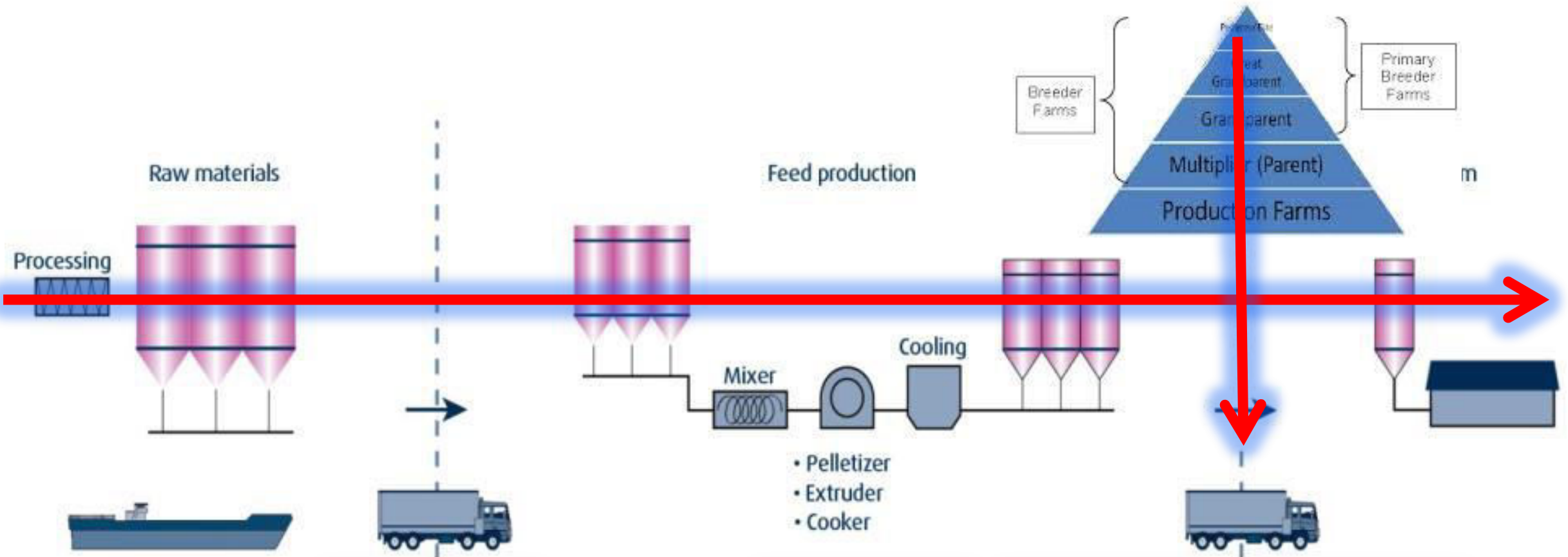
Legend

- Mold
- Enterobacteria
- Mold and enterobacteria

Salmonella scan

3

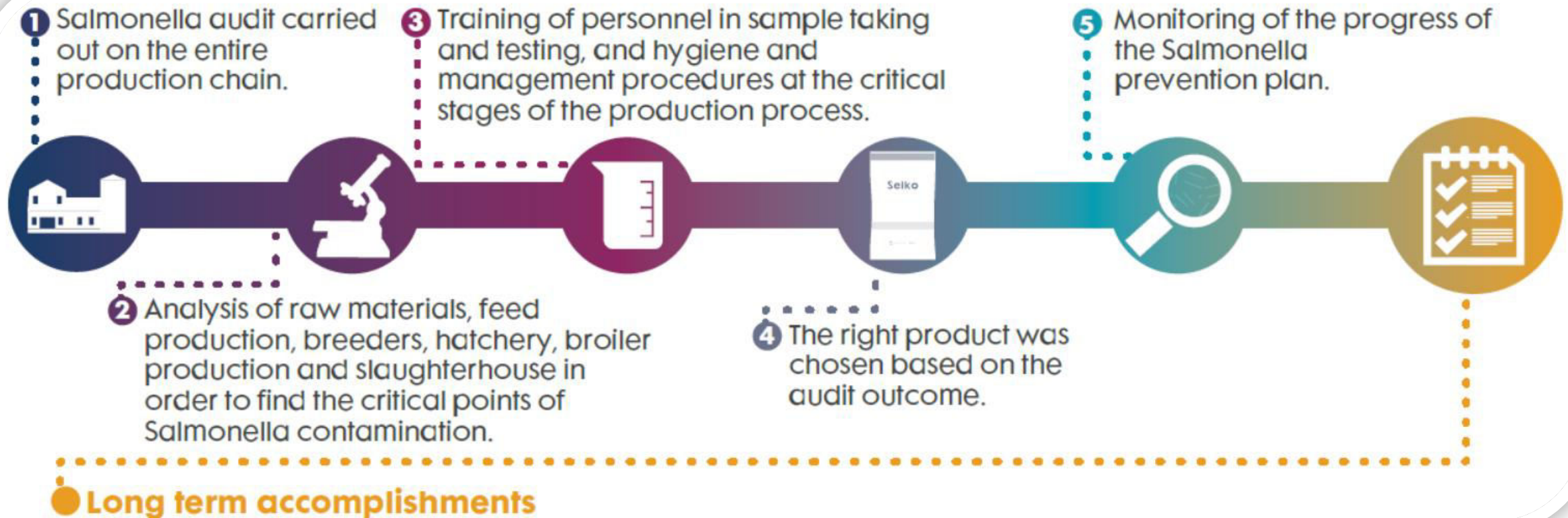
Gap analysis



Feed-Food Safety Program through integrated approach

3

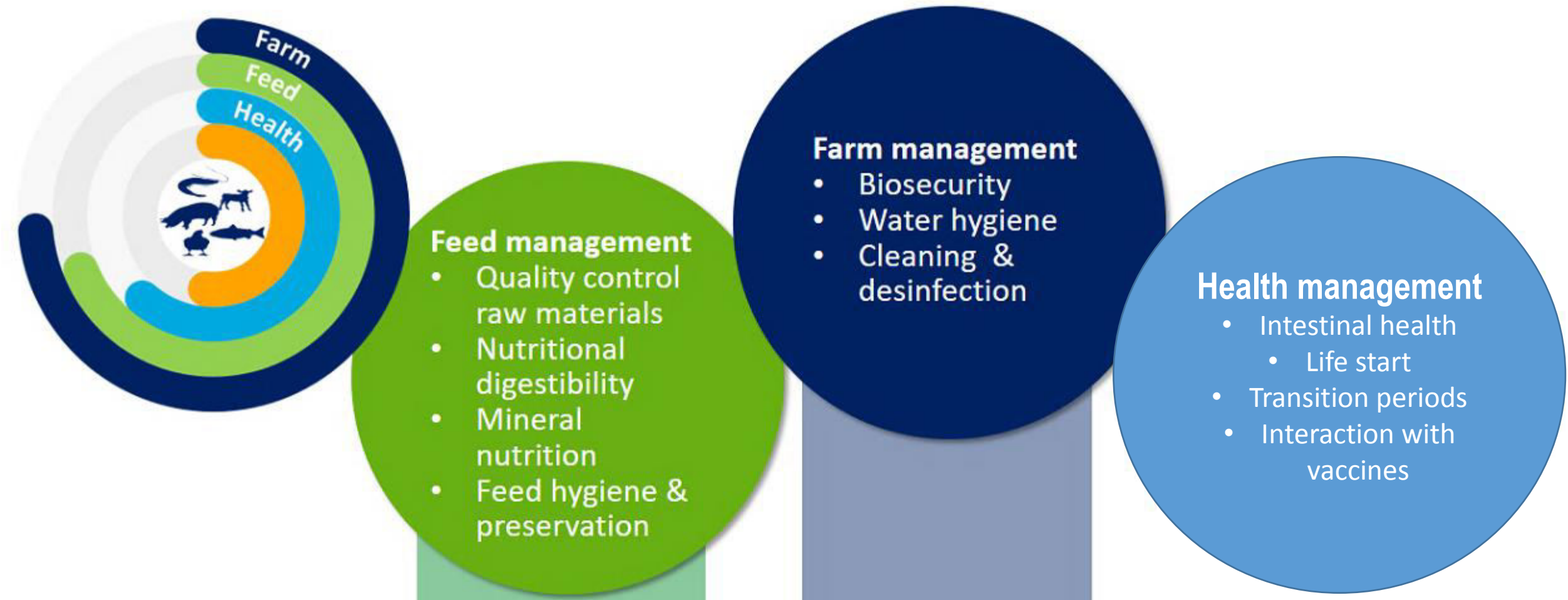
Gap analysis



Salmonella control program from feed to farm and health

3

Gap analysis





- Laboratory**
- Microbial/physical/mycotoxin analysis
- Customer**
- Feed Stress Test analysis



Spray applications

**Analytical results + Customer objectives =
Feed Safety solution**



Results

3

Gap analysis

1. Feed raw materials

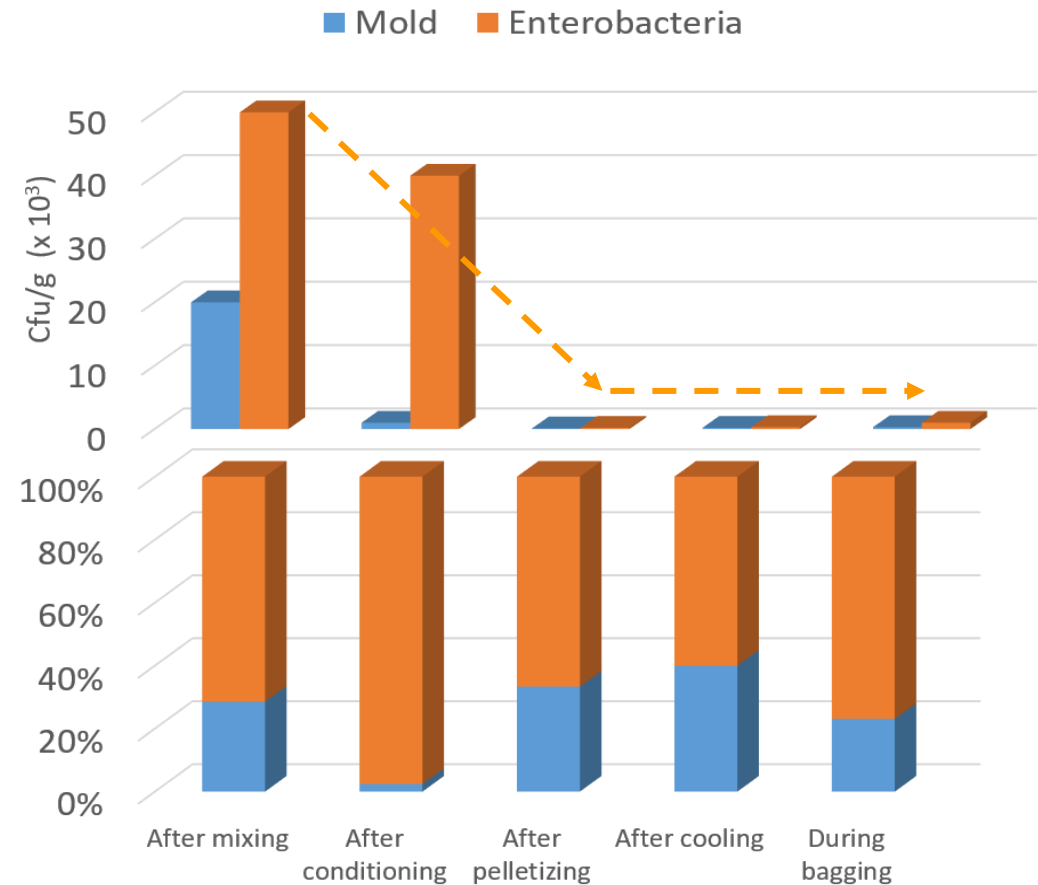
- De-oiled Rice bran and rice polish → mold contamination
- Local Maize → Aflatoxin contamination

2. Feed production

- Hammer mill/mixer/conditioner/cooler:
 - Enterobacteria and molds contamination
 - Strong decline of mold and enterobacteria after conditioner with relative higher shares of bacteria compared to molds



Enterobacteria and mold reduction through specified products



Relation of mold to bacteria contamination during feed processing

Feed safety control implementation

4

Advice

Product	Application	Service Support
Enterobacteria reduction	Flushing of feed mill system	<ul style="list-style-type: none">○ Regular sampling○ Laboratory analysis
Mold reduction	Running feed production	
Mycotoxin reduction		<ul style="list-style-type: none">○ Mycotoxin analysis & database

Objective

Feed Mill
Scan

Analysis/
Advise

Implementation

Evaluation

Dosing equipment solutions suitable for each feed mill

5

Implementation



Compensate weight losses during feed production



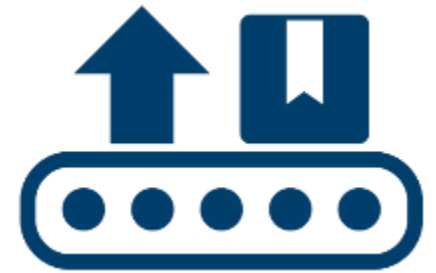
Enhance pelletizer capacity



Pelletizer energy reduction



Final feed has uniform quality



Increase feed shelf life

Precision feeding services

- **Optimising nutrition, improving profitability**
- NIR measurements and Nutritional Database combined to optimise nutrition
- Animal and economic modelling components to improve performance and profitability
- Focus on technical performance as well as business performance
- Strong scientific foundation and best-practice principles



Models
and services



How effective was the programme, where it needs adjustment?



Thank you for your attention



feeding the future

