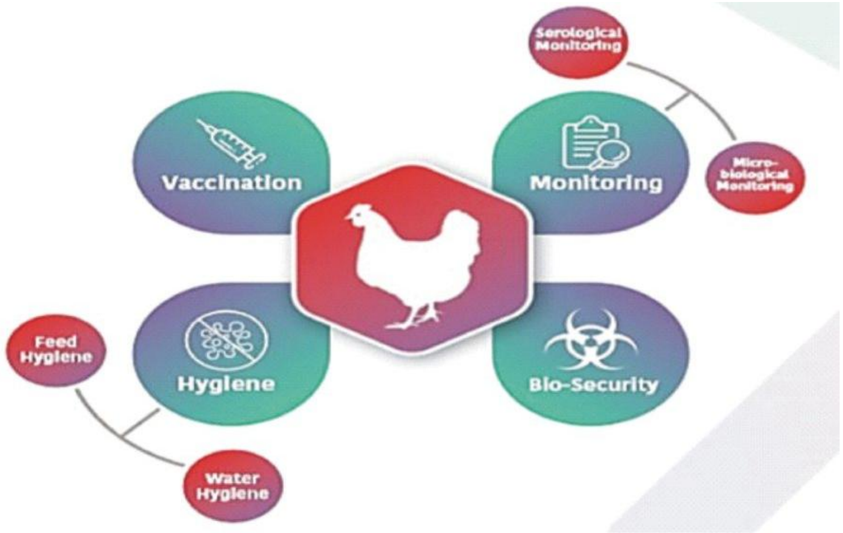
Chapter 1

Poultry management

Animal Health and Food Safety Hazards with Proactive Solutions

Hygiene and Health Management in Poultry Production



- Biosecurity involves practical measures to prevent and reduce the spread of diseases to animals, humans, and farm areas
- It is essential for maintaining flock health and profitable poultry production.
- Minimize the risk by controlling the movement of pathogens such as viruses, bacteria, and pests on farms
- Biosecurity is a cost-effective disease control strategy, built on two main principles:
  - Bio-exclusion: preventing diseases from entering the farm.
  - Bio-containment: limiting their spread if they occur.

Source: https://benisonmedia.com/poultry-management-and-biosecurity-measures/

Disease Transmission & Biosecurity

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Major routes of disease transmission

Around 90% of diseases spread between farms via contaminated people, equipment, and vehicles

Direct transmission can occur through:

- Ovarian (e.g., *Mycoplasma gallisepticum*)
- Eggshell penetration (*Salmonella spp*.)
- Waterborne (*E. coli*)
- Airborne (rare)

Pathogen survival in the environment also plays a key role in transmission.

Biosecurity standards

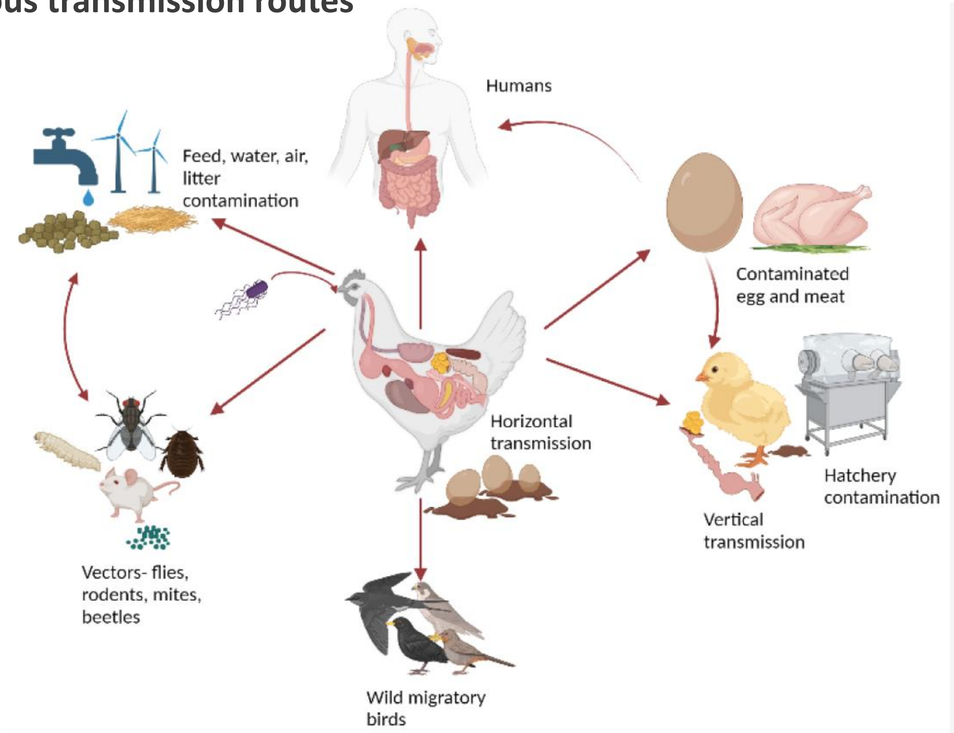
Biosecurity standards help reduce these risks:

- Clean clothing & boots; use hand sanitizer at entry/exit.
- Limit visitors & contact with outside birds; display clear guidelines.
- Keep pets, wild birds & livestock out of the farm.
- Regular disinfection of houses, vehicles, water, and equipment.
- Disinfect the farm before chick placement and eggs after hatching.
- Avoid sharing equipment; clean and disinfect between farms.
- Maintain the cleanliness of workrooms and litter handling.
- Restrict vehicle entry for deliveries; ensure proper sanitation.

Source: https://benisonmedia.com/poultry-management-and-biosecurity-measures/

From Flock to Kitchen: *Salmonella's* Journey

Overview of the various transmission routes of *Salmonella*



- *Salmonella* spreads from poultry to humans through multiple routes:
- Direct contact with infected birds or farm environments
- Contaminated eggs, meat, feed, and water
- Cross-contamination during processing and handling
- Environmental spread via manure, rodents, insects, or equipment
- It highlights critical control points to break the transmission chain and protect both flock and public health.

➔The same applies to *Campylobacter* and poultry meat!

Source: https://www.mdpi.com/2076-2607/11/11/2814

Two Major Poultry Pathogens — One Global Food Safety Challenge

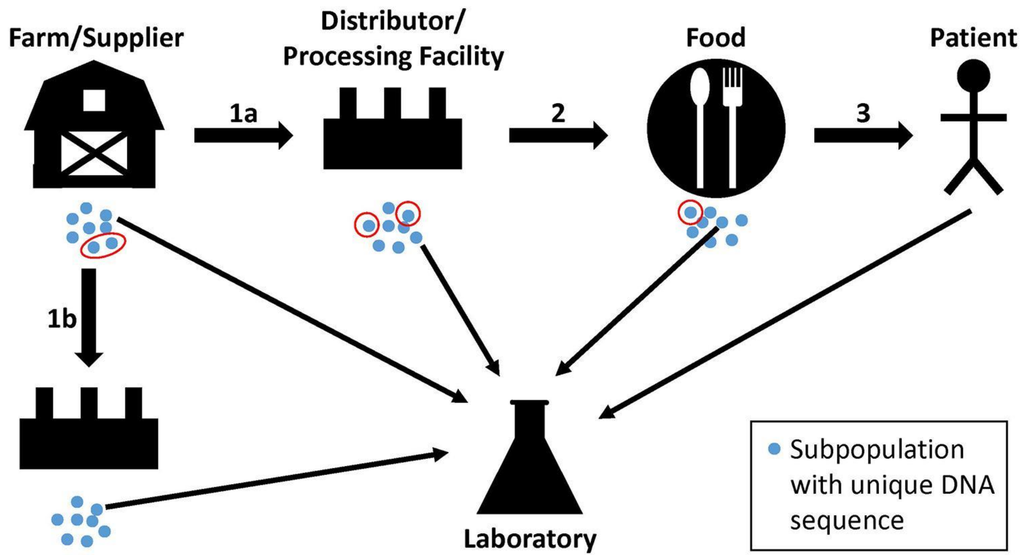
Item	Campylobacter spp.	Salmonella spp.
Global foodborne cases	≈ 96 million cases/year (majority from poultry meat)	≈ 78 million cases/year (eggs + poultry meat major sources)
Poultry prevalence	Up to 80–100% of broiler flocks colonized before slaughter	Flock infection rates typically 10–50%, depending on control measures
Infectious dose	<500 bacteria can cause illness	10^4–10^6 bacteria
Main transmission routes to humans	Contaminated meat during slaughter ↓ Cross-contamination / Undercooking	Contaminated meat or eggs ↓ Cross-contamination / Undercooking
Key control measures (Codex CXG 78-2011)	Biosecurity, hygienic slaughter, rapid chilling, consumer hygiene	Hatchery control, vaccination, hygienic slaughter, egg handling & cooking

Sources:
- WHO (2015) Global Burden of Foodborne Diseases
- FAO/WHO Risk Assessments: Campylobacter in Broilers (MRA-12) & Salmonella in Poultry (MRA-05)
- Codex Alimentarius Guidelines CXG 78-2011

Persistent strains behind recalls

GenomeTrakr, **FSIS** and **EFSA** programs have shown that **persistent strains** are behind many food recalls

Long-term environmental contamination is a major food safety threat.



Source of the figure: https://doi.org/10.3389/fmicb.2018.01482

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Chapter 2

Regulation & Export

Animal Health and Food Safety Hazards with Proactive Solutions

Pathogens tracking from Farm to Fork

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Monitoring and Data collection

- **Directive EC1 2003/99**
  - The European Union (EU) system for the monitoring and collection of information on zoonoses is based on Directive EC1 2003/99 which obliges EU Member States (MSs) to collect relevant and, when applicable, comparable data on zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks (FBO)

- **From 2023 Report from EFSA:**
  - Salmonella Enteritidis remained the most frequently reported causative agent for reported cases and food-borne outbreaks.
  - Salmonella in ‘eggs and egg products’ was the agent/food pair of most concern

Reporting Requirements

- Data on animals, food and feed must be reported for the following 8 zoonotic agents: Salmonella, Campylobacter, Listeria monocytogenes, Shiga toxin-producing Escherichia coli (STEC), Mycobacterium bovis, Brucella, Trichinella and Echinococcus

- In accordance with List A, Annex I of Directive 2003/99/EC

Source: The European Union One Health 2023 Zoonoses report

Regulations vs. Real-World Challenges

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Regulation

- **EC Regulation 2160/2003**
  - For instance, Europe, a big importer of poultry products from Egypt, has a strong regulatory backbone,
  - Broiler flock targets to updated sampling and testing standards, all designed to drive down Salmonella in poultry production
- **Codex committee**
  - Codex Committee on Food Hygiene is currently revising international guidelines on controlling Salmonella and Campylobacter in chicken meat at global level.
  - Hygiena is actively contributing to this global effort, being part of the Codex delegation.

Real Challenges

- Diverse **flock prevalence**
- **Emerging serotypes**
- **Farm-level risk factors**
- Uneven implementation across Member States

Domestic rules & practices on rapid microbiology methods' recognition

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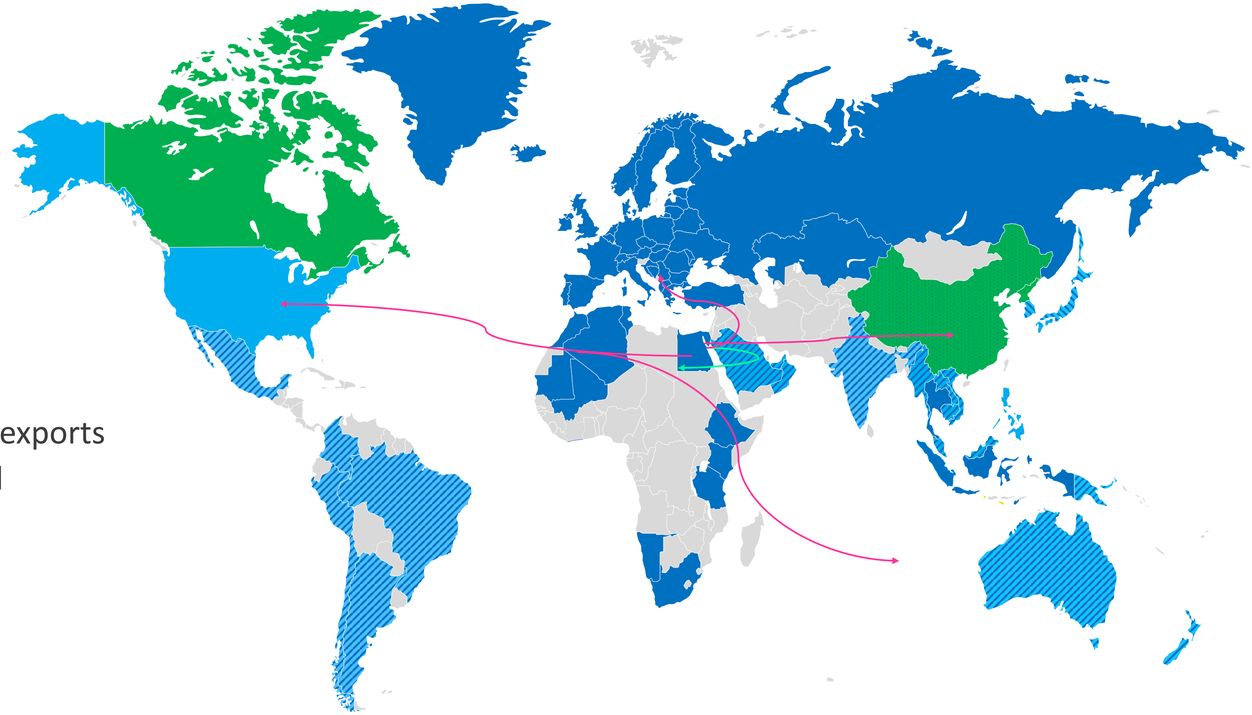
AOAC INTERNATIONAL

ISO afnor CERTIFICATION MICROVAL nen

Country specific



Observations

An Egyptian pourlty producer with a **domestic market** and exports to **Europe, Australia, China and Canada** should select rapid methods that are globally recognized. This approach:

1. Ensures compliance with international standards
2. Reduces the risk of rejection at borders
3. Facilitates smoother trade processes

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Chapter 3

Innovative Solutions

Animal Health and Food Safety Hazards with Proactive Solutions

Expert Solutions to Navigate Your Journey

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Food Safety Goals

- Verify biosecurity
- Early intervention and risk mitigation
- Product quality and safety
- Protect consumer health and company brand
- Detect pathogens early
- Verify and optimize sanitation

Enhance Efficiency within Business Operations

- Quick product release
- Manage testing with limited staff
- Increase profitability and efficiency
- Data-driven insights informing every step of your workflow (SureTrend)
- Instrument and equipment setup and servicing

Strategy

- Adapt to changing customer needs – New products and flavors, labelling of GMOs or Allergens

Testing along the Food Chain

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Solutions for	Parameter	Farm: Primary production samples	Farm: Feed & Water	Processing	Final Product
Environmental Monitoring	ATP (Surfaces & Water)		X	X	X
	Quality Indicator Organisms			X	X
Feed, Raw Materials and Product	GMO		X (Feed)		X
	Mycotoxins		X (Feed)		X
	Pathogens (PCR)	X		X	X
Data Management	Data management software	X	X	X	X

Farm and Feed

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Farm and Feed

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Did you know that mycotoxins can reduce feed efficiencies in animals being produced?

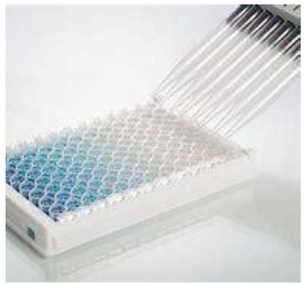
Hygiena offers a streamlined solution for all your feed testing needs, from Mycotoxin and Pathogen Detection to GMO analysis, to keep your flock and herd healthy.

Breadth of portfolio
Variety of qualitative mycotoxin and GMO solutions

Ease of use
Simple and reliable detection and quantification technology that is widely trusted throughout the food industry

Reliable results
Trusted results for actionable decisions

High throughput
Test many samples at one time!



Environmental Monitoring

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Environmental Monitoring (EM) Solutions

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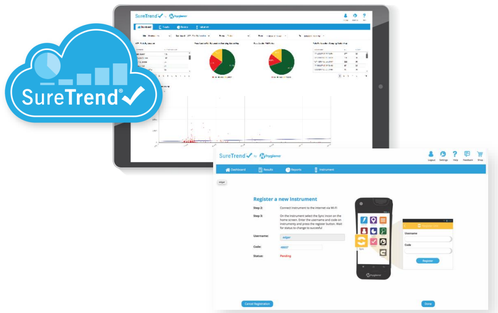
360° View of Your EM Program

Ensure your production environment is clean and free of contaminants. Hygiena's EnSURE® Touch and SureTrend® platform set the industry bar for innovation with unrivaled connectivity, flexibility, accuracy, and speed. The EnSURE® Touch supports data collection and analysis for detection of ATP and microorganisms.



Environmental Monitoring Case Study: “Verification in a Swab”

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Situation

- Needed of a simplified solution for cleaning verification that meets NPIP and EUCAST requirements in hatcheries that provides results in seconds compared to 24-48 hours
- Concerned about a centralized data management system with global access
- Requested simple tools for global rollouts

Our Response

- Provided the simple and intuitive ATP UltraSnap® solution for Aviagen labs to implement in hatcheries and farms, globally
- SureTrend® allows for effective data management to be audit-ready globally, no matter where the data is being reviewed

Aviagen®

Value Delivered

Increased Productivity
Accelerated time to decision, improve productivity and competitive advantage while gaining actionable results in 10 seconds!

Automated Data Visualization
Illustrated daily ATP swabs built into a simplified data management system for easily accessible data at all times of the day, in all locations across the globe

Customer-Centric Solution
Provided convenient and easy-to-use workflow that increased accuracy of data within a trusted system for customers to use

Environmental Monitoring – Indicators

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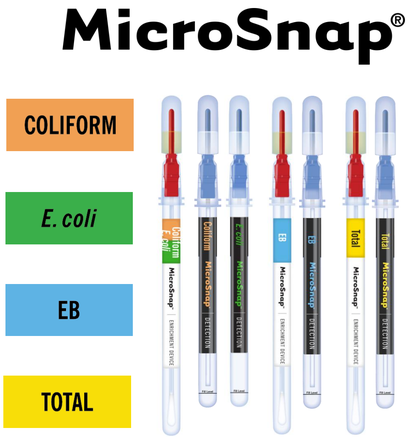
Rapid Indicator Testing

MicroSnap® and InSite® indicator tests are AOAC-approved, sensitive, accurate and precise.
They allow for early warning and give rapid alerts to reduce recalls.



- Bring indicator testing in-house
- Quicker data-driven decisions
- Integrated Analytics Software
- Reduce costs

SureTrend

EnSURE Touch

PCR and Automation

Molecular Diagnostics Solutions

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Pathogen Detection and Quantification

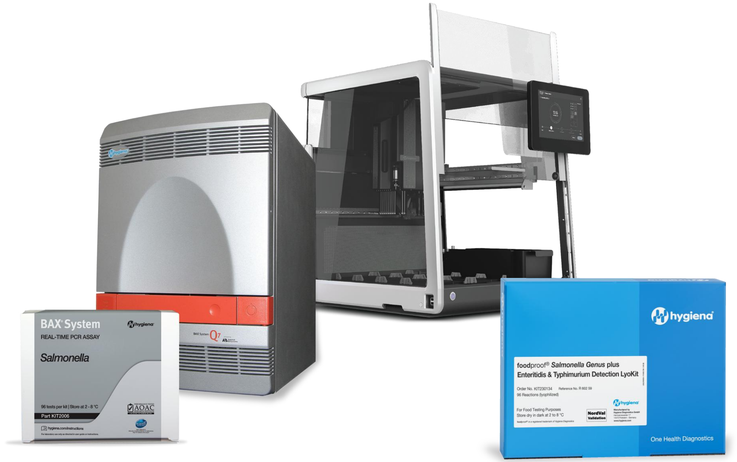
Trusted Leader in Food Safety and Veterinary Diagnostics

Breadth of portfolio with vast validations
Globally regulatory validations and 1,000+ application studies across many matrices

Intuitive Use and Simplified Workflows
Increase lab productivity with streamlined protocols with automation

Reliable Platform that Produced Trusted Results
Trusted results due to a high sensitivity and specificity

Diagnostics Support Globally
160+ technical sales and support team members available around the world



Quantification Case Study: “Monitored Care”

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Situation

Utilized primary production *Salmonella* levels to:

- Pre-scheduled incoming loads per flock to make harvest order decisions
- Ensured interventions can reduce incoming load to reduce final product positives
- Tracked final product positives back to flock: farm incentive program for lower *Salmonella* flocks
- “Hot” barns have corrective actions of litter changes and increased sanitation

Our Response

- Demonstrated the BAX® System SalQuant® workflow
- Estimated reductions in time to result and cost-savings for the customer.
- Utilized BAX® System SalQuant® and CampyQuant™ for decision making as a food safety program in all facilities and farms from broilers to egg production

Value Delivered

Increased Productivity
Aided in quicker time to result that resulted in faster diversion decisions

Improved Ease of Use
Provided a seamless workflow solution that fit nicely with the production and laboratory schedules

Customer-Centric Solution
Contributed a convenient and easy-to-use workflow that provided increased insight into their production systems

Pathogen testing with real-time PCR

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Screen for *Salmonella* spp

ISO 16140-2:2016 validated by MicroVal to ensure global method recognition by the competent authorities

- Certified for different segments including: Meat and Meat Products, Egg products, feed samples and primary production samples

foodproof® Salmonella spp. method (liquid and lyophilized)
vetproof® Salmonella spp. method (lyophilized)

Screen + Identify *Salmonella* species in a single test

Rapid detection of *Salmonella spp*. and identification of *Salmonella Enteritidis* (SE) and *Salmonella Typhimurium* (ST) in a single test

- A single test to screen for *Salmonella* and identify serovars critical to poultry industry
- Simplifies workflow – multiplexing technology eliminates need to prepare more than one PCR tube per sample
- Holds ISO validation on relevant raw and ready-to-cook-poultry matrices and environmental samples

foodproof® *Salmonella* Genus plus Enteritidis & Typhimurium Detection LyoKit

Detect *Campylobacter*

Detection and quantification of thermotolerant *Campylobacter* species in food samples

- simultaneous detection of *C. jejuni, C. coli*, *C. lari*, and *C. upsaliensis*, with specific identification of *C. jejuni and C. coli*.
- Superior sensitivity
- Rapid result

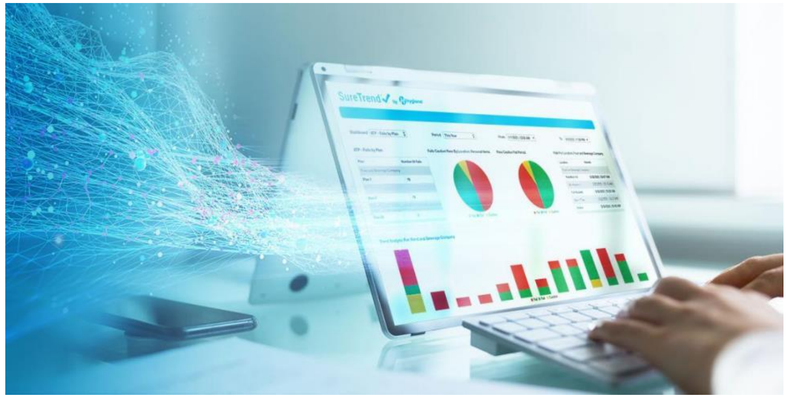
foodproof® Campylobacter Detection Kit:
foodproof® Campylobacter Quantification Kit

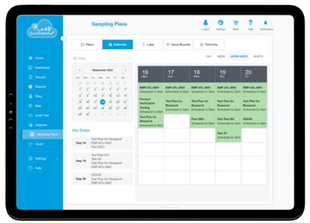
Simplify data management

Real-Time Data for Smarter Environmental Monitoring and Compliance

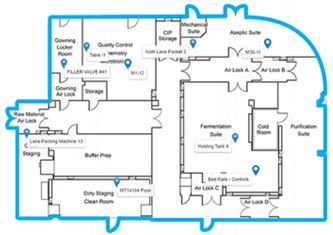
Smart environmental monitoring goes beyond testing: It's about turning data into action:

- Currently available platforms centralize hygiene and pathogen results across sites, helping teams **spot trends**, **act quickly** and **reduce risk.**
- From ATP to pathogens, integrated tools support **early detection** and **data-driven decisions** that keep operations running smoothly.

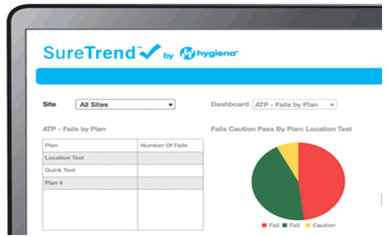




Custom templates and real-time updates **simplify sampling plan** and **tracking**



Use environmental maps to visualize **contamination hotspots at a glance**



Generate **multi-site reports** to benchmark and prioritize actions

Easily integrate testing tools and get **real-time feedback,** right from the production floor

How Sure Trend Transformed Perdue's Data Management

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Situation

- Perdue's existing system was falling short in meeting their comprehensive needs for Environmental Monitoring
- Need for a robust solution that could manage their entire environmental monitoring program, beyond just ATP data.
- Primary challenge was to integrate a platform capable of consolidating all of Perdue's diverse data into a single, accessible dashboard

Our Response

- Environmental Monitoring complete solution
- Suretrend‘s comprehensive interface offered them simplicity and efficiency in data management.

Value Delivered

Save time and focus on critical information

Manage all your test data in one place

Assess Risks Easily

Drive Organizational Insights

Easily visualize complex data and simplify decision making

Company overview

Hygiena

We Take Pride in Our Mission

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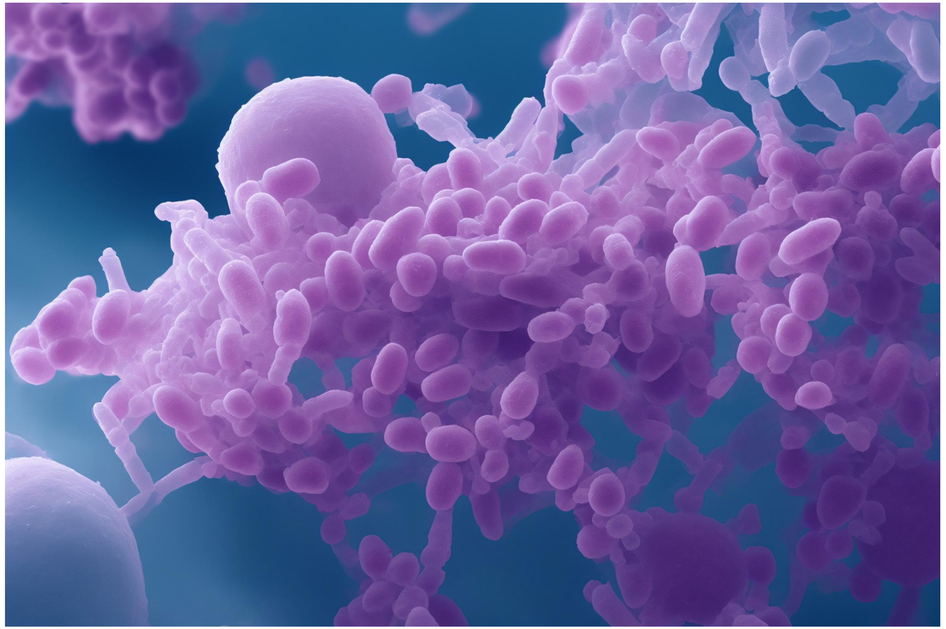
Mission:

We create innovative diagnostics for a healthier world

Customer Focus:

We provide integrated One Health Diagnostics®
from farm to fork to our customers around the world
in the areas of environmental monitoring, production animals, food manufacturing, water, food service, healthcare, and other industrial fields. We embrace
the “One Health” belief that the health of people is closely connected to the health of animals in our shared environment.



Our Global Reach

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Countries	98
Offices	13
Employees	650+
Global Customers	90,000+
Field Services	150+
Scientists	98

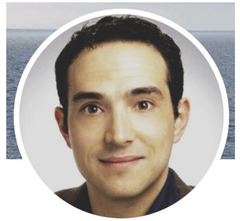
hygiena GlutenTox Pro SureTrend BAX Innovate MicroSnap EnSURE Touch foodproof

Discuss with the Hygiena team

Rani Ahmad

Regional Business Manager
Middle East, Turkey, Africa

Hygiena



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Hygiena

Allow Hygiena To Be Your Food Safety Partner!