

Spray Control

Pathogen protection can be enhanced with advanced spraying technology. By Bill Kohley, Ph.D.

Meat processors have a common goal: ensure the highest level of food safety possible while minimizing production costs. Anti microbial interventions and sanitation processes are optimized with precision spray control. These spray technologies save production costs by applying expensive pathogen protection agents precisely and reliably. Spray technology improves consumer

safety, worker safety, and offers processors a means to monitor and log their chemical applications.

post-lethality interventions—and provides a new sanitation approach for processors and case examples where processors have successfully addressed sanitation and post-lethality interventions in meat processing operations.

An effective solution in any process plant lies in the triangle of successful pathogen protection, an integrated approach to addressing all the key variables that affect sanitation and post-lethality agent effectiveness.

The triangle of successful pathogen protection suggests processors focus on three key areas to eliminate foodborne pathogens: the processing line, the chemistry, and the application technology for chemical intervention. When these three disciplines work in unison they maximize the impact of anti-microbial interventions. (See figure this page).

Process criteria and production techniques are determined by individual meat processors in accordance with Good Manufacturing Practices (GMPs), Sanitation Standard Operating Procedures (SSOPs), and the firm's HACCP plan. The processing line is the responsibility of the processor who knows better than anyone else the variability of operating conditions and the correlations these process variables have on final results. If a processor is designing or rebuilding a line, they can greatly benefit through partnering with chemical and application professionals during design.

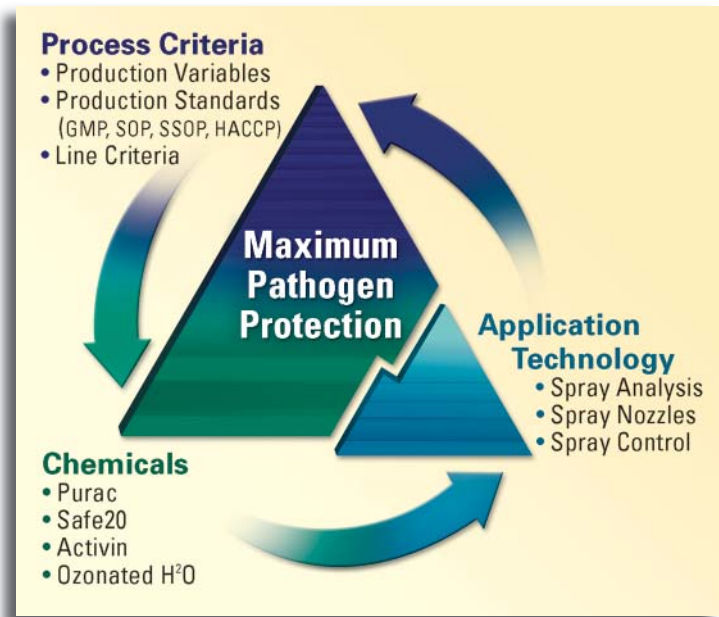
The next point of the triangle is determining what types of chemicals (antimicrobial agents and sanitizers) are appropriate for a plant's processing needs. Substantial progress has been made by food microbiologists and chemical suppliers in recent years to develop safe, effective, and reliable chemicals to destroy pathogens. Factors such as chemical concentration, temperature, and carrier all affect the kill rate of antimicrobial agents.

Delivery (application of the chemical to the substrate), the final point of the triangle, is one that is too often overlooked. This involves the reliable release of effective chemicals onto the product, into a package, or onto the equipment handling the product. Even the most technically advanced chemicals cannot prevent pathogen "grow out" if they are not applied accurately.

Having issued the "Interim Final Rule on Control of *Listeria monocytogenes* in RTE (Ready-To-Eat) Meat and Poultry Products" in October 2003, USDA continues to review compliance standards for eliminating foodborne

pathogens in meat products. While final regulations will likely not be in place until 2006, the interim measures encourage RTE producers to use both post-lethality treatments and antimicrobials to significantly reduce the risk of *Listeria* presence and/or growth, in addition to maintaining aggressive sanitation practices throughout processing machinery and equipment.

The American Meat Institute Foundation responded to USDA's ruling by developing four strategies to guide its members in controlling *Listeria*. This article addresses two key strategies every processor can take towards improving food safety – better sanitation and



Dr. William Kohley is vice president of AutoJet Technologies Division, Spraying Systems Co., Wheaton, Ill. Reach him at mpeditorial@wattmm.com

Processors must carefully study the key spray

Advanced spray technologies enable processors to clean machines and equipment with minimal water usage and properly apply sanitizing and antimicrobial chemicals.

characteristics affecting chemical effectivity. Advanced spray technology offers an ideal solution for many sanitation and post lethality interventions. Proper nozzle selection can improve sanitation results. Proper nozzle selection can improve pathogen reduction. Once these variables are known, automated spray systems are now available to verify the application of chemicals more precisely than ever before – a very important feature for processors validating programs for “alternative” status.

The triangle helps processors identify and focus on three key factors of a successful sanitation and intervention program. When selecting the best spray technology, the following four technologies are essential considerations in meat processing lines.

Four factors affect optimizing spray performance for meat processors: proper spray nozzle selection, preventative maintenance, spray analysis, and automated spray

control. Choices in each of these areas address critical aspects of the sanitation and pathogen control challenge.

Spray nozzles. Thousands of different products are available from spray nozzle manufacturers, and their value in anti-pathogen efforts depends on several performance factors:

1. Flow rate: The volume of fluid sprayed at a given pressure.
2. Spray pattern: The dimensions and uniformity of coverage on the desired target.
3. Drop size and velocity: The particle size and speed.
4. Cycle speed: An automatic nozzle’s ability to spray intermittently based on process variables such as line speed or product size.

A solid knowledge of spray technology ensures proper nozzle selection. The commonly held belief that simply increasing spray pressure and flow rate will improve cleaning effectiveness can be counterproductive. High-pressure sprays may actually disperse pathogens, and high flow rates intro-

KUSEL Floor Drains

THE INDUSTRY ORIGINAL



- All Stainless Steel Construction
 - Level with Floor
 - Withstands Heavy Traffic
- USAD-Accepted Sanitary Design
- Removable Solid or Perforated Collecting Basket
- Custom Modifications Available
- Backed by 150 Years Experience



PO Box 87
 Watertown, WI 53094
 Tel: 920-261-4112
 Fax: 920-261-3151
 email: sales@kuselequipment.com



www.KuselEquipment.com

The triangle of successful pathogen protection requires expertise in three key areas to eliminate foodborne pathogens.

duce more moisture, creating an even more hospitable environment for pathogen growth.

The physical condition of spray nozzles also greatly impacts results. A worn nozzle can significantly affect the flow rate of the chemicals or water being sprayed long before a change in the spray pattern is visible. Establishing a preventive maintenance plan for a spray system can preclude expensive over-application of chemicals or water, and is a critical step to effective sanitation and pathogen protection.

Spray analysis. In some cases, analyzing the spray application with sophisticated testing equipment can improve the performance of existing chemical programs. Spray analysis can help determine three key spray performance criteria:

1. Particle size: The optimal size of individual droplets for chemical efficacy.
2. Spray velocity: The proper droplet speed, when combined with drop size, affects the impact of the spray on the target.

3. Nozzle positioning and spacing: The physical location of nozzles on the processing line.

Some factors have significant impact on the effectiveness of antimicrobial agents. Misting and overspray may result from droplets that are too small in size. Excessive velocity caused by too much pressure may cause splashing or bounce-back of liquids. Improper placement of spray nozzles can result in poor coverage of the target area. Advanced spray analysis can be helpful in optimizing a system for the most effective and efficient application.

Spray control. After choosing the right nozzle and determining the right operating conditions, additional challenges face processors as they seek to optimize a facility's spray system, because monitoring and controlling a system so that it operates at peak efficiency can have significant impact on final product quality and food safety. Manual control of monitoring and controlling spray variables can be difficult, and is a key reason why automated spray control



FOODLOGISTIK
Neubrandenburg GmbH



Today's Name in Dicing!

— CUBE

— SLICE

— STRIP

Meat – Poultry – Fish – Cheese – Vegetables ♦ **Select from Five Models**

Fast – Accurate – Diced Products with CES/Foodlogistik Dicers.

Special cut items such as soup ingredients, salad and pizza toppings, Julienne strips and Stroganoff/Fajatas are made quickly and efficiently.

- 400 to 4800 lbs/hr with one person
- Grid selection from ¼" to 2 ½"
- Prepress feature assuring uniform cubes
- S-Knife available for small cubes
- Heavy Duty Stainless Steel Construction. USDA approved

For more information, Contact: www.dicers.com

Don Ballein
CES/Foodlogistik U.S.A.
2128 M So. Grove Ave.
Ontario, CA 91761 U.S.A.
Phone: 909-947-8511
Fax: 909-627-0087

Toll Free: 1-888-278-0885




VAC AIR®

NEW TOE WEB CUTTER



U.S.D.A. APPROVED
PATENT NO. 5454754
6062971
6062973

MODEL TWC-4
FOR HOGS

- NON-CLOGGING SYSTEM
- FAST - REDUCES PROCESSING COST
- REMOVES HAIR & GLAND'S COMPLETELY
- SAFETY GUARD
- TABLE MOUNTED UNIT AVAILABLE
- 90 PSI

VAC-AIR, INC.

5254 NORTH 124TH STREET
MILWAUKEE, WISCONSIN 53225
Phone: (414) 353-5270
Fax: (414) 353-5289
EMAIL: VACAIRINC@AOL.COM
WWW.VAC-AIRINC.COM

technology is gaining increased recognition particularly by meat and poultry processors.

Dedicated spray controllers that monitor and operate spray nozzles can be an invaluable tool in ensuring peak performance and compliance with USDA pathogen-reduction directives. Spray controllers are pre-programmed with nozzle performance data and are up to 10 times faster than basic PLCs, providing exceptional timing and flow control in any spraying application used for food processing.

An automated spray control system can usually be installed and placed into an operation with minimal downtime and virtually no programming time. Once installed, ongoing maintenance and operation of spraying applications become greatly simplified.

The two following examples demonstrate the value of an automated spray system in sanitation and pathogen protection.

Case 1, Sanitation. Nightly spraying with quaternary ammonia using portable sprayers is a common method for sanitizing food and meat processing equipment. Manual spray application of quat utilizes sanitation labor and frequently results in inconsistent application of chemicals by different operators. If too little chemical is used, sanitation is compromised and food safety is at risk. If too much chemical is used, chemical is wasted and the equipment may need to

be completely washed down before resuming production. In most sanitation processes, proper spray coverage is dependent on the operator.

An automated fogging system with a dedicated spray controller and air atomizing nozzles suspended from the ceiling can dramatically improve this process, enhancing food safety while providing a quick payback. The fine mist provided by such systems evenly coats the processing equipment and all exposed surfaces within the spray zones at the touch of a button, eliminating the need for manual spraying. The quat is atomized with consistent drop size and distribution.

A spray controller can monitor and operate dozens of spray zones throughout the plant, while providing independent control for each zone. In addition, the controller can ensure precise dilution and consistent application of the cleaning chemicals – factors that are critical to meeting governmental regulations. The status of any zone within the plant can quickly be checked and adjusted as necessary. The spray controller provides data logging which is an important step toward compliance.

Four factors affect optimizing spray performance for meat processors.

BEACON INC.

THE COMPANY WITH THE STAINLESS REPUTATION®

STAINLESS STEEL TRUCKS & SCREENS

Beacon designs and manufactures both Trucks and their matching Screens to meet customer's needs.. Our challenge, considering the ever increasing cost of stainless steel, is to design Screens and Trucks to carry maximum weight required using the minimum amount of stainless steel. We at Beacon are experts at making these decisions.

• • • • •

SCREENS

- Mesh Screens • Wires One-Way • Jerky Screens
- Heavy-Duty Bar Stock Screens
- V-Screens for Bolo Product • Vertical Processing Screens

• • • • •

TRUCKS

- Four upright Design • Space Saving Nesting Trucks
- Heavy-duty designs for maximum load capacity
- Bacon Processing Trucks • Notched Level Trucks for Smokesticks.






100 S. Mannheim Road, Hillside, IL 60162 • Tel (708) 544-9900

FAX (708) 544-9999 • www.beaconmetals.com • sales@beaconmetals.com

A spray controller can monitor and operate dozens of spray zones throughout the plant, while providing independent control for each zone.

Case 2, Ascorbic acid spray. The application of ascorbic acid on meat products using hand-held spray devices is another operation that showcases how advanced spray technology can benefit meat processors. Common challenges found in case ready operations include:

1. Improper timing or misdirection of the spray patterns into trays.
2. Under- or over-application due to operator error or worn spray nozzles.
3. Misting due to excessive spray pressure.

The inconsistent chemical coverage, excessive chemical use, unsafe work environment, and improper package sealing problems that can result from these conditions are significant threats to product quality, food safety, and worker safety.

An automated spray system with a dedicated spray controller can improve the ascorbic acid spray operation in several ways:

1. Precise spray timing and proper nozzle positioning

ensure spray coverage only on the target area.

2. Accurate flow control maintains proper chemical dosage even when line speeds change.

3. Operators can be notified or the entire system shut down if spray performance varies beyond acceptable ranges, such as when a nozzle wears or becomes plugged.

4. Spray data logging can facilitate compliance.

5. If necessary, standard communication protocols allow integration with existing plant control systems.

Safe treatment of equipment and food during processing is, of course, smart business. The already stringent government standards will very likely be heightened in the years to come, making compliance the most significant challenge for meat processing companies. Nothing can affect sales more negatively than publicity stemming from a product recall.

So while each food processor's goal is to produce the safest – and highest quality – food product at the lowest cost, it is easier said than done. QA, process engineering, production, and maintenance staff must communicate to optimize operations. Optimizing and automating sanitation/antimicrobial applications can help:

1. Increase product and process quality: An automated spray control system can adjust for varying production conditions quickly and accurately, eliminating human error and reducing labor costs.

2. Reduce chemical usage and improve worker safety: An automated spray control system can ensure optimal chemical usage and prevent overspray, for better working conditions in cases where overspray can cause slippery floors or misting that affects air quality.

3. Improve system monitoring and data logging: An automated spray control system provides added assurance when chemical application is difficult to monitor and can track chemical usage for easier compliance.

Without leading-edge performance in all three areas of the triangle of successful pathogen protection – process criteria, chemistry, and application technology – food safety can suffer, perhaps with devastating results. An integrated approach has proven itself to improve success and reduce implementation time of pathogen protection initiatives. **MP**

ATTENTION SHIPPING CUSTOMERS



**Shopping for the smartest way to transport your products?
Ship SmartWay™ and save 7% on fuel.**

SmartWay™ Transport helps shippers and for-hire carriers lower greenhouse gases and other emissions, while at the same time giving the average truck a fuel savings of \$2,000 per year.

To find out more about this new partnership, call for your info kit at **1-734-214-4767** or log onto **www.epa.gov/smartway**.



A new voluntary program from the U.S. Environmental Protection Agency