Going for maximum kill

An integrated food-safety program calls for a full arsenal of in-plant intervention systems

By Bryan Salvage, executive editor

When Greater Omaha Packing Co, opened its Omaha, Neb.-based beef harvesting plant in July 2000, it was designed to be a showcase of sanitary design and microbial intervention systems. The plant, which processes 14,000 head of cattle a week, includes a state-of-the-art arsenal of pathogen-fighting weapons, including a recirculating closed air system, computerized temperature control and individual work station sterilizers.

"We always operated under the idea that we needed to run our products as clean as possible," says Angelo Fili, executive vice president.

When it comes to food safety, Greater Omaha Packing put its money on the table to live up to the commitment, Fili says, spending about one-third of its budget on microbial interventions and food safety.

Food-safety showcase

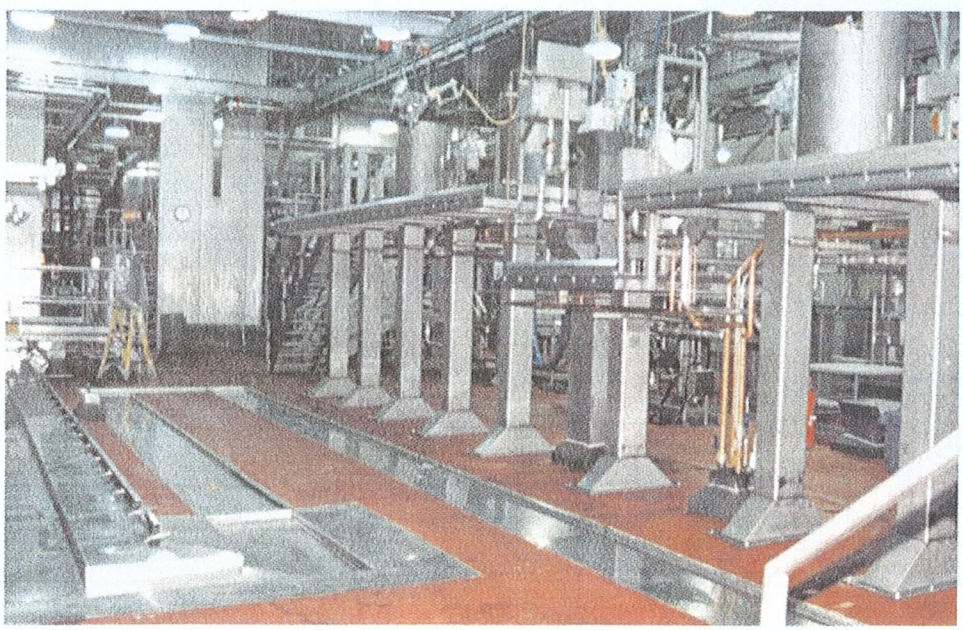
Food safety features at Greater Omaha's plant include:

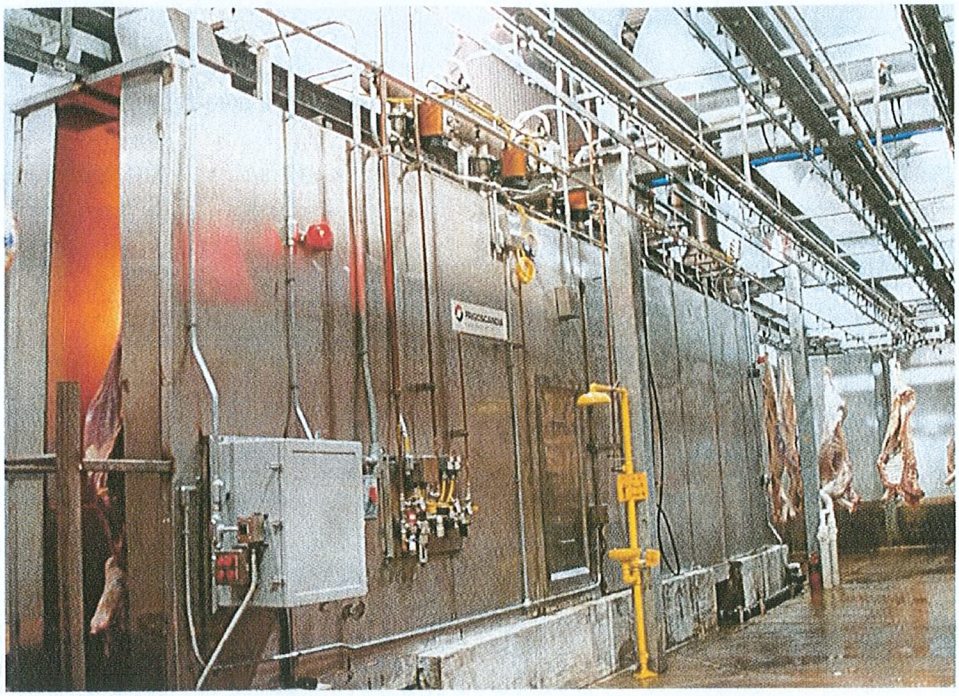
- a closed air system, which filters air six times an hour;
- stainless steel walls; paint on walls contains plastic to prevent natural bacteria absorption;
- no traps on drains in plant;
- all drainage, plumbing materials are stainless steel, oversized;
- drains drop through floors into a pit in basement and pumped to a treatment plant. No connections to city sewer system inside plant;
- any equipment, such as a clamp, or shackle restrainer, that touches the animal is sanitized by 180 degree F water before it touches the next animal;
- kill floor blood runs into stainless steel drain pan;
- each work station has a sterilizer to clean tools between animals;
- each person on line has small stainless-steel shower to wash themselves;
- workers, stations in the hide-on and hide-off areas are totally segregated;
- after hide removal and before evisceration, carcasses go through a steam blow-off, steam vacuum area, lactic acid wash and a high-pressure hot water wash;
- once carcass is eviscerated, trimmed and accepted by inspectors, it is put through another hot water wash, steam cabinet and a lactic acid wash, which is at mouth of cooler and hot box.

That commitment is setting the standard, experts say. Because one "silver bullet" technology to rid packing and processing plants of harmful pathogens is unlikely to ever be developed, producing the safest meat products possible requires developing and implementing an integrated food-safety program. That means incorporating effective intervention systems.

James Marsden, regent's distinguished professor, Kansas State University, says the hallmarks of a successful program include:

- an ongoing commitment to manufacturing practices and sanitation;
- some form of pasteurization (thermal, chemical or irradiation—or combinations of these); and
- secondary barriers to provide necessary safety nets





A lengthy blood trough (below left) enhances efficiency and sanitation at Greater Omaha Packing's new plant; steam pastuerization (left) is used by many packers.

When linked together in a production plant, these interventions can dramatically reduce the food-safety risks associated with food processing. "The challenge now is to get them employed," Marsden says.

Multi-front attack

Salmonella and listeria monocytogenes in beef and pork products, and E. coli O157:H7 in beef products, are the primary pathogen targets. Marsden tells *MMT* the most effective microbial intervention systems combine thermal and chemical treatments.

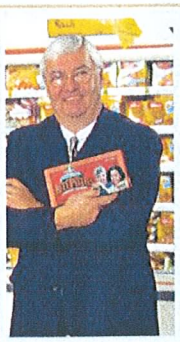
Most recently, the Food Safety and Inspection Service approved downstream interventions, such as steam or hot water pasteurization and the use of approved chemicals, for use on trimmings or sub-primals prior to further processing.

"FSIS hasn't formalized a directive but they have made a policy decision that trimmings and subprimals are not items that constitute a standard of identity," Marsden explains. "Therefore, Food and Drug Administration GRAS (Generally Recognized as Safe) interventions that are allowed to be used on USDA products also can be applied to those items downstream in the process."

Properly applied, interventions can reduce numbers of food-borne pathogens and serve as pathogen control points, says Jennifer Johnson, director of lab services for Milwaukee-based Emmpak Foods.

"Interventions may be incorporated into a Hazard Analysis & Critical Control Point plan as a critical control point or implemented as a part of a facility's GMPs or Sanitary Standard Operating Procedures," she adds. "In any case, interventions are designed to complement existing GMP and sanitation programs—not replace them."

The good news is that packers and processors have plenty of options, from hot water to steam to anti-microbial ingredients and surface treatments to high-pressure technology and irradiation of fresh product.



Post-packaging pasteurization systems are promising. Food irradiation seems to be gaining the most momentum. Cliff Albertson (left), sales and marketing manager of Chandler, Minn.-based Huisken Meats, says distribution of Huisken BeSure brand irradiated products continues to grow.

Most slaughter plants combine from two to five interventions, Johnson says. She adds that the most common interventions include steam vacuums, hock or tail steam vacuums or washes, pre-evisceration rinse/sprays (typically water followed by acid), acid washes or sprays (e.g. 2 percent lactic acid), hot water rinses or steam pasteurization systems, trisodium phosphate solution sprays/washes, hydrogen peroxide solutions, proprietary chemical mixtures, and post-steam cabinet organic acid washes.

Choose your weapon

Which microbial interventions are most commonly used by beef slaughter houses and packers? It varies.

"Steam vacs, carcass washes and steam pasteurization are the main interventions we use; we don't use hot water washes," says Excel spokesman Mark Klein.

IBP inc.'s Triple Clean process is used in its beef slaughter and packing plants. The process consists of a series of intervention processes applied to each carcass. Primary technologies include steam vacuums; carcass washes and organic acid rinsing systems and steam pasteurization, further complemented by a final organic acid rinse. IBP does not use hot water systems. (See April 2000 issue for more on IBP's Triple Clean process.)

Other companies, however, including ConAgra, Farmland, Packerland and Rosens, do use hot water washes, says one supplier. In fact, the past four new beef plants built in the United States all installed a hot water pasteurization system, he adds.

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FOOD SAFETY INTERVENTION

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–Jennifer L. Johnson, director of lab services, Emmpak Foods

Carcass interventions

- Steam vacuums-Typically used on carcass locations that are prone to contamination or as an alternative to knife trimming. May be applied at various points in beef carcass dressing process (after dehiding, after evisceration and/or at a subsequent step prior to final wash). Like knife trimming, steam vacs may result in some spread of contamination to adjacent sites. Are rarely used as the sole intervention in a slaughter plant but more typically in conjunction with other interventions.
- Organic acid application (including pre-evisceration acid spray/wash)-Application of organic acids (lactic acid, acetic acid, citric acid) is one of the older carcass interventions. Application of organic acid interventions to chilled beef carcasses prior to fabrication is also effective.
- Thermal interventions-Hot water and steam applications at various temperatures and times can significantly reduce pathogens n carcasses and carcass pieces.
- Proprietary chemical interventions-Includes cetyl pyridium chloride (CPC), acidified sodium chlorite, tridosium phosphate, activated lactoferrin, etc.
- Chilling and carcass spacing-Fast heat and moisture removal from the carcass surface minimizes microbial growth. Avoid tightly packing carcasses into a "hot box."

Source: Emmpak Foods

◀ 29 **Further value-added plants**

A range of interventions is available for processors of further value-added products. Owasso, Okla.-based National Steak & Poultry uses sanitizers, strict refrigerated and cooking-temperature controls, anti-microbial ingredients including lactic acids, and gas-flushed and vacuum packaging to enhance food safety.

Chung Wu, quality control manager for Chicago Meat Authority, says CMA's HACCP plan monitors receiving temperatures to ensure the temperature doesn't exceed 50 degrees F.

Other company interventions include:

- strict adherence to personal hygiene, safe product handling;
- butcher knives sanitized in 180 degrees F water throughout the day; and
- after processing, fresh product stored in cooler kept between 28 degrees F. and 32 degrees F. Frozen products are kept at –10 degrees F to –15 degrees F.

"We also have a solid pathogen 32 ▶

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– Angelo Fili, executive vice president, Greater Omaha Packing.

Ready-to-Eat interventions

- Incorporating organic acids or their salts into RTE-product formulations
- Surface treatments, such as dipping product into bacteriostatic treatment solutions (including concentrations of acetic acid, sodium diacetate or potassium benzoate)
- Dipping product in organic acid solutions
- Extra stringent GMPs and sanitation needed in slicing and packaging RTE products to help prevent cross-contamination. Added interventions can include: specially constructed "clean rooms," surface disinfection of the outer package of RTE products entering the room; and a strong environmental monitoring program.
- Some raw and RTE products can't be subjected to the pre-mentioned interventions for a variety of reasons including surface configurations and being ground products. So, irradiation and high-pressure treatment are two interventions that can be applied to microbial pathogens in raw meat and poultry; industry is awaiting final FDA approval of irradiation for use on further value-added RTE meats.

Source: Emmpak Foods

◀ 30 test program to verify microbial interventions on sanitation and refrigeration/ freezing methods," Wu says. "And outside lab-test samples are taken on a regular basis to detect the most prevalent pathogens including E. coli O157:H7 and listeria monocytogenes. We use in-house TPC tests for raw materials to detect aerobic plate counts.

"We audit raw material supply to include a list of pathogen interventions including steam pasteurization and carcass chemical rinses [to be] employed by our suppliers," Wu adds.

The future

It's a given that microbial intervention technologies will be used more in-plant. But more is needed to ensure food safety. Johnson adds: "Interventions will only succeed with the support of the cold chain and strong sanitation and GMP programs."

Greater Omaha's Fili adds that sharing information is critical, as well.

"I feel that food safety is never proprietary," Fili says. "If there's a better way to do it, I would want everyone to know about it because it makes the entire food chain that much safer."