

P.28 PACKERS TAKE COVID
FIGHT TO THE AIR

P.41 LAWMAKERS THINK BIG FOR
SMALL PROCESSORS

P.62 TYSON TAKES A
'BOLD POSITION'

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Grade A

U.S. SECRETARY OF AGRICULTURE SONNY PERDUE GIVES THE INDUSTRY HIGH MARKS
FOR ITS RESPONSE TO COVID-19, BUT SAYS THE PANDEMIC'S IMPACT WILL
REQUIRE SOME NEW SCHOOLS OF THOUGHT

UP *in the* AIR

As meat and poultry

operations across the nation work to prevent the spread of COVID-19 in processing facilities, they're taking the fight to the air. In part, that's due to mounting scientific evidence that indicates the highly infectious novel coronavirus, also known as SARS-CoV-2, is transmitted through the air, not by person-to-person (via respiratory droplets) or surface contact alone.

In a July scientific brief issued by the World Health Organization, the global public health authority said that preliminary research suggests that

"SARS-CoV-2 may also spread through aerosols in the absence of aerosol generating procedures, particularly in indoor settings with poor ventilation." In addition to studies that show related viruses can survive in lower temperatures and lower humidity, other research indicates that COVID-19 can travel through the air up to approximately 26 feet in a meat plant.

The latter study, conducted by Germany's Heinrich Pette Institute, Leibniz Institute for Experimental Virology (HPI), was conducted during the month-long shutdown of Germany's largest

pork abattoir and meat processing complex due to a COVID-19 outbreak that infected 1,500 workers in May. Researchers found that "the low temperature, low fresh air supply and constant air circulation through the air conditioning system in the hall, together with hard physical work" in the deboning area of the meat processing plant, promoted the airborne transmission of SARS-CoV-2 particles over great distances.

Adam Grundhoff, co-author of the study and HPI research group leader, noted, "It is very likely that these factors in general play a significant role

Photos by Getty

In the battle against COVID-19, several meat processors are looking to **UV light** and other advanced air cleaning technologies. But do they work?

by Julie Larson Bricher, science and technology editor

in the globally occurring outbreaks in meat or fish processing plants. Under these conditions, a distance of 1.5 to 3 meters [13 to 26 feet] alone is obviously not sufficient to prevent transmission.”

None of this is particularly good news for meat processing plants, where COVID-19 prevention and intervention tactics have focused on intensified sanitation measures for facilities and surfaces, instituting mandatory face coverings and personal protective equipment (PPE) policies, and installing hand hygiene stations and physical barriers between workers.

But, with a stronger understanding of a facility’s airflow patterns — and by adopting some of today’s advanced air cleaning technologies — meat and poultry processors can step up their air defense strategies as part of an effective multi-barrier approach to reducing COVID-19 in the plant.

LIGHT AIRBORNE ARTILLERY

One of the top air cleaning technologies that is being tried and tested in meat processing facilities is ultraviolet (UV-C) light, which is routinely used to disinfect water, work spaces

and surfaces. Essentially, UV lamps emit DNA-disrupting wavelengths of light capable of killing or deactivating viruses and microorganisms.

UV-C disinfection systems for rooms, surfaces, and heating, ventilation and air conditioning (HVAC) are an ideal preventive measure to complement filtration and other sanitation and disinfection practices in meat and other food processing plants, says Tatiana Koutchma, food engineer and novel processing technology



Read the study
on airborne
COVID-19 at
[meatm.ag/
covidairstudy](https://meatm.ag/covidairstudy)

**I AM 100%
CONVINCED** THAT
UV-C LIGHT IS A
RELIABLE MEANS
TO REDUCE VIRUS
TRANSMISSION RISK.

A UV robot cleans the floor of Pittsburgh International Airport. UV technology has been deployed in meat processing plants to halt the spread of SARS-CoV-2 among workers.

research scientist with Agriculture and Agri-Food Canada.

"Microorganisms, particularly viruses, are small so standard air filters are not sufficiently effective," says Koutchma. "UV-C light reliably reduces microbial loads and improves environmental hygiene and storage conditions, even in cold environments."

The benefits of UV-C units installed in rooms and storage cold facilities are not limited to killing pathogenic bacteria on surfaces and in the air, she adds. UV-C systems have been shown to reduce problematic molds and pathogens that are found within the HVAC system, drain pans, and surfaces; were they not spotted and reduced, those molds and pathogens would be introduced to the products and adversely affect shelf life and quality.

Although UV systems have not been specifically tested against COVID-19, she says, they have been tested and proven reliably effective against similar viruses and pathogens that require an

even higher dosage for inactivation than coronavirus.

"I am 100% convinced that UV-C light is a reliable means to reduce virus transmission risk, considering the latest reports that COVID-19 is airborne," Koutchma states.

However, there are two safety issues related to UV applications, Koutchma warns. The technology can produce ozone at levels that prove a respiratory irritant to humans, and the light generated can also cause harm to workers.

"Worker exposure can be easily addressed by manufacturers, but often they can be overlooked," she says. "Because UV-C light is harmful to skin or eyes, the light should not reach people. The UV-C treatment at 253.7 nm must be done in a manner when facilities are not occupied or when workers are sufficiently protected."

Advances in far-UVC light, which has a shorter wavelength and higher photon energy than conventional UV-C lamps,

may solve the worker safety problem. In June, scientists from New York's Columbia University Irving Medical Center published a study showing that continuous airborne disinfection with far-UVC light at the current regulatory limit could greatly reduce the level of airborne virus in indoor environments occupied by people.

The study found that more than 99.9% of an exposed virus had been killed by a very low exposure to far-UVC light. The researchers reported that they estimate that continuous exposure to far-UVC light at the current regulatory limit would kill 90% of airborne viruses in about 8 minutes, 95% in about 11 minutes, 99% in about 16 minutes, and 99.9% in about 25 minutes.

Far-UVC light cannot penetrate the tear layer of the eye or the outer dead-cell layer of skin, and so it cannot reach or damage living cells in the body, the scientists noted, which means that it can be used in occupied spaces.

theISSUES

ON THE GROUND

JBS USA and Tyson Foods are among the companies leading the way in using UV-C light and other innovative air cleaning applications to clean and disinfect air in meat processing environments.

JBS USA evaluated several technologies, including microfiltration, increased ventilation with outside air, increased humidity and ozone technology, according to Eduardo Noronha, global head of operational excellence at JBS USA. However, they all had downsides.

For example, the company found that microfiltration required a lengthy delivery of equipment, he says. Higher humidity, which helps coalesce viruses, also encourages growth of microorganisms

[AIR CLEANING] TECHNOLOGIES CAN SERVE AS A **READY-TO-USE SECONDARY BARRIER** IN CONJUNCTION WITH CLEANING AND SANITATION.

and is a food safety concern. Similarly, increased ventilation is problematic, because it makes temperature control more difficult to achieve. And while ozone "is phenomenal at killing microorganisms," it also is a respiratory irritant that can create issues for employees.

Noronha says that the company is employing UV light systems and ionization technologies as part of its air cleaning strategy. He noted that while UV has been shown to be very effective at killing microorganisms, it needs 20 seconds of contact to assure deactivation.

"We added UV lights in our HVAC systems, as well," says Noronha. "These lights are directed at the condenser coils where fine droplets of water con-

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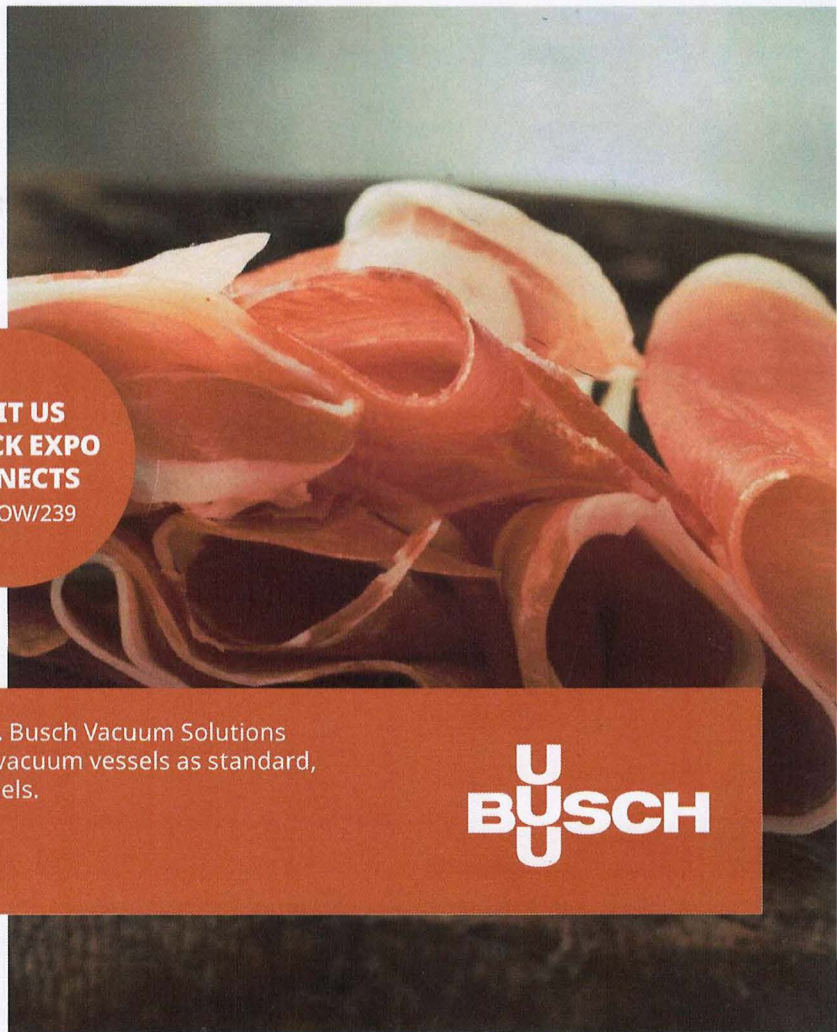
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dense and collect. Here, UV has the time to directly contact microorganisms and deactivate them."

Tyson also is prioritizing efforts to mount an air defense against COVID-19 with UV light technology, notes Worth Sparkman, the company's senior manager of public relations.

"Our engineering and operations teams have been doing extensive research on air flow in our facilities to better understand how it might benefit team members during the pandemic," Sparkman says. "We're also testing numerous new technologies to include ultraviolet air treatment systems across several of our plants."

On another front, JBS also has invested



JBS has experimented with a number of new technologies in its plants, including plasma bipolar ionization technology, to develop its air cleaning strategy during the COVID-19 pandemic.

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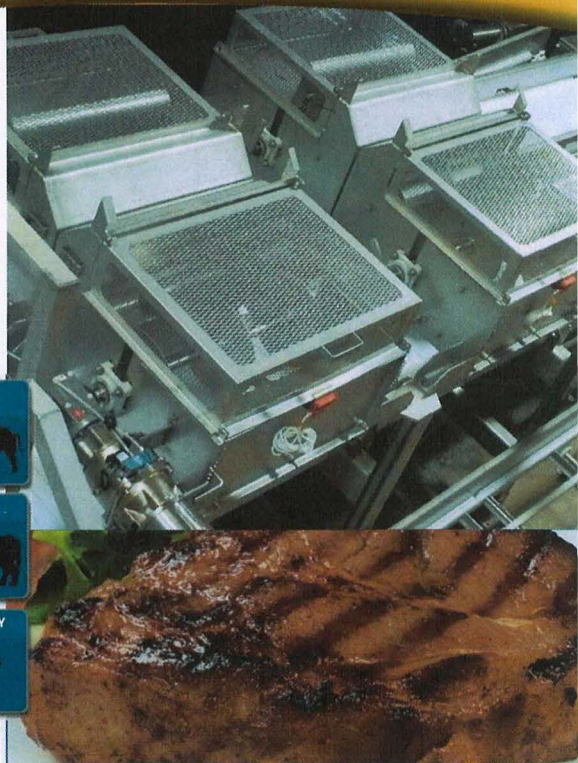
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THE [PLASMA
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TECHNOLOGY IS
INSTALLED IN
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millions in plasma bipolar ionization technology across its beef, pork and poultry plants "to ensure the best possible air quality for our team members," Noronha adds.

Plasma bipolar ionization technology is used across multiple industries to remove smoke and VOCs [volatile organic compounds], as well as microorganisms like bacteria and viruses, he says. Ionizers emit negative ions, which attach to the positive ions of airborne particulates and chemically disrupt cells or molecules to effectively neutralize pollutants such as microorganisms. Unlike other ionization technologies, little to no ozone is generated when ionizing the air.

According to third-party testing published by the ionizer manufacturer Plasma Air, the technology was shown to reduce airborne coronavirus surrogate by 99% in about 10 minutes.

"Where possible, the [plasma bipolar ionization] technology is installed in supply air ducts of HVAC systems for maximum effectiveness," Noronha explains, noting that portable units can also be utilized and are designed to circulate the air in a room through the unit. "Because we have large facilities and many HVAC systems, a significant number of these units were purchased to support all of our facilities."

All of the beef, pork and prepared foods manufacturer's facilities have incorporated these air quality improvement technologies into their HVAC systems. Employees wear eye protection, masks and gloves along with other personal protective equipment (PPE) while in production areas. "We specifically targeted welfare areas where employees must remove some amount of PPE such as bathrooms and cafeterias," he adds.

This technology has been scientifically validated and proven effective in other settings, such as hospitals, Noronha says,

theISSUES

noting that “our initial results have been promising.”

“AIRING” ON THE SIDE OF CAUTION

The science is still out on how significant

and under what conditions airborne transmission of COVID-19 is actually occurring, and questions remain as to the full efficacy and safety of air purification technologies in meat plants. However,



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er, the science suggests that the use of air disinfection systems should be part of a multi-barrier approach to prevent and mitigate the transmission of COVID-19, says Koutchma.

“Since UV light and other air disinfection technologies significantly reduce total pathogenic load in the air — and at critical contamination points such as food contact surfaces, packaging and PPE — they can serve as a ready-to-use secondary barrier in conjunction with cleaning and sanitation,” Koutchma states, “especially in fast-moving conditions such as a high-speed meat or poultry processing lines.”

JBS's Noronha agrees, adding that the priority is to provide the safest working environments possible for employees in meat manufacturing facilities.

“Due to the proven effectiveness — as well as the high adoption rate — of plasma bipolar ionization and UV proven technologies, we were able to make this technology available for our employees much sooner than other technologies,” Noronha says of JBS's decision to adopt the advanced air cleaning systems. “We also felt that these technologies were safer for our employees.”