



Sunview Integrated Solutions

Chicken, Pig and Cattle Farm Applications - Whitepaper

What our Plasma Ionization-based
Air Purification systems eliminate



VIRUSES



BACTERIA



MOLD



FUNGI



ALLERGENS



VOCS



FUMES



ODORS

The compliance standards that our systems meet



How Plasma Ionization-based Air Purification systems work



Step one: Plasma tubes produce large amounts of positive and negative ions

Step two: Charged ion clusters actively attack the ambient pathogens and harmful particulate

Step three: The destruction of their cell membranes, DNA and proteins begins

Step four: The completed process results in the deactivation and eradication of the ambient pathogens and harmful particulate

Air Purifiers on Animal Farms

With the increasing scale and intensification of livestock production, the ammonia produced by livestock and their waste is increasing, which not only affects their normal production performance levels, but its presence also endangers their health. Specifically, livestock excrement and fertilizer will emit odor, ammonia, mercaptan, hydrogen sulfide, carbon dioxide, carbon monoxide and other malodorous gases.

Installing active Plasma Ionization-based air disinfection and purification equipment quickly targets the source of the resulting air pollution to decompose odors while effectively preventing plague, avian flu, swine flu (H1N1) and other influenza viruses, along with the possibility of cross-infection.





Why are farm air disinfection systems used at all?

Machines that specifically deliver Air Disinfection protect animals and plants against disease and crop failure. Good hygiene reduces the need to use pesticides and medicines and lowers veterinary costs.

Further, these systems greatly reduce the need to use chemical-based disinfectants in agriculture, as it has become most evident the use of large quantities of chemicals leaves behind harmful and in some cases, DNA-changing residues in agricultural products and also gives rise to resistant pathogens.

These are among the long-lasting effects and direct benefits delivered by Plasma Ionization-based Air Disinfection systems.

CHICKEN FARMS

When Plasma Ionization-based systems are installed, in conjunction with the existence of the proper levels of ventilation, the chances of disease occurring in a chicken house are relatively small.

PIG FARMS

A lot of harmful gases exist on pig farms, however Plasma Ionization-based systems combined with proper levels of ventilation prevent pigs from suffering respiratory diseases, among others.

CATTLE FARMS

Plasma Ionization-based systems prevent the invasion of germs and along with proper ventilation, create a sterile breeding environment.

Practical Application – Pig Farms





Air Purification for Removing Ammonia from Chicken Farms

Chicken farms produce a large number of bacteria, particulate matter, microorganisms, ammonia, fluidized hydrogen, bad odor and other influenza viruses, meaning that chicken coop air must be sterilized and purified on an ongoing basis and Plasma Ionization-based systems have proven to be the optimal solution.

Ammonia will be produced within the chicken coop environment, so the mitigating equipment used must be anti-corrosion and explosion-proof, however it cannot use electrostatic dust removal or high-pressure dust removal types of purification technology.

Poultry will also get sick if they breathe air with high levels of ozone concentration, so the equipment used cannot produce ozone and in addition, because ozone is a strong oxidizer, ozone and ammonia will react chemically/combine to produce even more harmful substances.

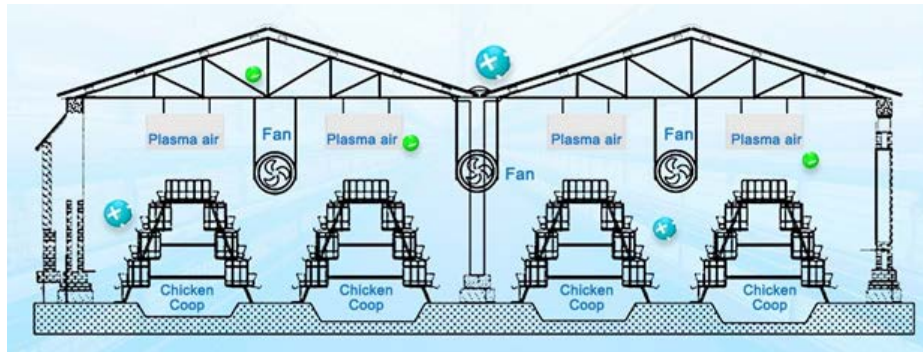


The air ecosystem that results from the utilization of Plasma Ionization-based systems will also greatly reduce the highly stressful work levels, along with the exposure levels of the facility's staff, resulting in a significantly safer and more productive work environment.

Further, these Air Purifying systems help to ensure that the chicken house environment meets all of the mandated guidelines and requirements, in terms of its ambient conditions and has delivered improved livestock breeding survival rates by more than 10%, increased the egg production rates of poultry by 20% and has advanced the growth period of livestock by 5-10%.

The elimination of the odors generated during the breeding process is also of great importance not only for those on site, but also for surrounding residents whose lives are affected by the pungent odors emitted by facilities that don't have Plasma Ionization-based systems installed.

Disinfection & Purification Devices Applied to Chicken Farms



Potential Applications of Non-thermal Plasma in Animal Husbandry to Improve Infrastructure

September 4, 2021

Infrastructure in animal husbandry refers to the fundamental facility conditions and services necessary for better living conditions for animals and the resultant improved business outcomes/highly profits. Mainly, infrastructure can be divided into two categories: hard infrastructure and soft infrastructure. Physical infrastructure, such as buildings, roads, and water supplying systems, belongs to hard infrastructure. Soft infrastructure includes services which are required to maintain economic, health, cultural and social standards of animal husbandry. Therefore, the proper management of infrastructure in animal husbandry is necessary for animal welfare and its economy.

Among various technologies to improve the quality of infrastructure, non-thermal plasma (NTP) technology is an effectively applicable technology in different stages of animal husbandry. NTP is mainly helpful in maintaining better health conditions of animals in several ways via decontamination from microorganisms present in air, water, food, instruments and surfaces of animal farming systems. Furthermore, NTP is used in the treatment of

wastewater, vaccine production, wound healing in animals, odor-free ventilation, and packaging of animal food or animal products. This review summarizes the recent studies of NTP which can be related to the infrastructure in animal husbandry.

Keywords: Animal husbandry, infrastructure, non-thermal plasma, technology, products, review

Animal husbandry, a component of modern agriculture, concerns the animals that are raised for commodities such as meat, milk, eggs, fur, leather and wool. The well-being of animals in animal husbandry has ethical, scientific, political and aesthetic components which are required for better animal management, welfare/humane treatment, handling, care and high productivity (1).

Infrastructure is one of the major contributors to the well-being of animals which usually associates with management issues regarding nutrition, health, transportation, mustering and handling and other special invasive practices (2).

Non-thermal plasma (NTP) has been identified as a potential approach to improve the quality of infrastructure systems and facilities including buildings, medications, food, ventilation, water supply, instruments and other

special management practices (3–7). NTP is partially ionized matters in gaseous states at low temperatures and energy is mostly stored in free electrons (8).

Different devices have been introduced to generate NTP including dielectric barrier discharges (DBD), atmospheric plasma jets, coronas and, surface and microwave discharges for numerous applications in different fields (9). NTP is environment-friendly, free of toxicity and requires a low temperature. These characteristics of NTP do not put animals and environment in animal husbandry at risk (10,11).

Therefore, NTP can be considered as an effective potential application to improve infrastructure, without disturbing animal well-being.

In this review, we summarized the already known applications of non-thermal plasma in the infrastructure sector of animal husbandry with regard to the well-being of animals and higher productivity which is necessary for its financially profitable function.

We also highlighted the studies about the applications of NTP for improving infrastructure in other fields and hypothesized its use in animal husbandry. However, more systematic research is still required to bridge knowledge

gaps particularly on NTP and the infrastructure of animal husbandry.

Role of NTP in Bio-decontamination to Provide a Healthy Environment for Farm Animals

The presence of various micro-organisms such as bacteria, biofilms, fungi, spores of fungi and protozoan parasites and their genes and metabolites in the environment increases the health risks to farm animals by causing and spreading numerous diseases (12,13).

Therefore, bio-decontamination of surfaces, instruments and water is necessary in animal husbandry to maintain a healthy environment. Several methods have been introduced for this purpose including oven or autoclave sterilization processes, chemical sterilization such as ethylene oxide sterilization, Gamma irradiation, high hydrostatic pressure technique and microwave sterilization. The limitations of these techniques such as the possibility of chemicals to remain after sterilization, requirement of complex, expensive and high security equipment and the requirement of special conditions for operations have also been discussed (14,15).

Therefore, NTP has been suggested as an effective, less toxic and low-cost method for bio-decontamination by several research groups. Also, none of the destructive

effects on decontaminated surfaces were detected following NTP treatment (14,16,17). Furthermore, NTP can be used to decontaminate heat-sensitive surfaces and instruments as it is used at room temperature (18).

Commonly, most decontamination techniques target the membrane of a cell as it separates its inner compartments from the environment (14). NTP has general and specific effects on the cell surface of living organisms (14,19-21). In addition to cell membranes (14,22-26), NTP targets DNA (14,24,26,27) and proteins (14,26,28) to destroy living organisms (Table I).

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