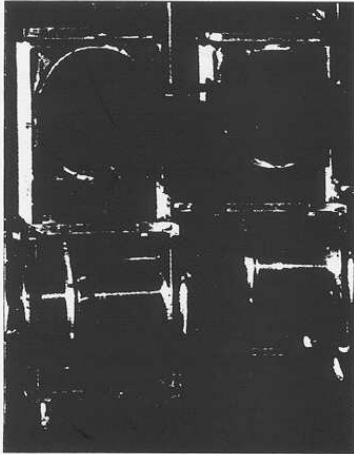


Heat Sterilization

AN OLD, BUT NEW METHOD FOR ELIMINATING INSECTS IN FEED MILLS



Portable heaters have the advantage of flexibility in moving to wherever they are needed during a heat sterilization. Photo courtesy of Aggreko Inc., New Iberia, LA.

Using temperature control, either heating or cooling, is not a new technology to eliminate insects in agricultural facilities. Within the feed and food industries, heat sterilization of production facilities to kill stored product insects dates back to the turn of the century.

The procedure was abandoned because of the damage caused to wood floors, melting of belts, and grease becoming liquified and running out of unsealed bearings. Today, with advances in building and equipment technologies and increased regulation over conventional insecticides, heat sterilization can be an effective means of eliminating insects.

By simple definition, heat sterilization is a process by which an area or material is heated to a target temperature, generally between 130 and 140 degrees, and maintained for an adequate time period to ensure penetration of the heat to desired locations throughout the building. This may

be a few minutes for a single piece of equipment or up to 24 hours for an entire facility.

Getting Started

Because of its scope, a heat sterilization project requires the cooperation of many departments. Production, engineering, sanitation, maintenance, shipping, warehousing, and personnel need to interact to plan every step. Much preparation and coordination is needed to ensure success.

It should be emphasized that any form of temperature control to kill insects is not, by itself, a cure-all for every type of facility. It should be part of a total, plantwide integrated pest elimination program that also includes:

- Raw material inspections.
- Daily housekeeping.
- Equipment cleaning.
- Routine self-inspections.
- Pest control programs.
- Finished product rotation.

Areas to Heat Treat

It may not be necessary to perform heat sterilization of an entire facility. The following criteria should be considered:

- Where are your stored product insect problems now, or where is there a high probability for problems?
- Areas targeted for heat sterilization need to be able to attain and maintain heat sterilization temperatures.
- Items that could be damaged by heat sterilization must be moved to temporary storage.
- Low stored product infestation areas such as coolers and freezers need not be heat-treated.

Consideration also needs to be given

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to the cubic-foot area to be heat treated to fit enough heaters into that area to do the job effectively and economically.

Types of Heaters

Heaters can be electric, high- or low-pressure steam, or natural gas-powered. Air normally is heated and discharged. Heaters can be portable or built permanently into the area to be treated. The benefit of using portable heaters is

their flexibility for moving them during an actual heat sterilization if more or less heat is needed elsewhere.

Efficiency and economics should not be compromised. Heater BTU range varies with size. Experience has shown that it's better to have too much BTU capacity than not enough.

The number of heaters and their location in areas to be sterilized depends on the number of BTUs needed to attain the target temperature, the logistics of fitting them within current building and equipment design patterns, the energy source used, and the volume of area to be heated. A building engineer should do a BTU calculation first, figuring building heat loss and the effect heat sterilization temperatures will have on the facility structure and equipment.

One of the most important factors to keep in mind is to keep the hot air moving. For example, blow it down from the ceiling to the floor, to the outside walls, and to every part of the heat sterilization area. Additional fans may be needed.

Heaters should have thermostat capabilities to allow the regulation of heat output during a heat sterilization. More heat will be required initially, with less after target tempera-

tures are attained.

Getting Ready

A thorough machine cleaning is very important before a heat sterilization. Your goal should be to remove accumulations that may harbor stored product insects and/or allow them to be insulated against the heat.

Waste containers need to be emptied, and cabinets, dust collectors, and other equipment, where practical, should be cleaned and sealed against heat loss. To allow more effective heat penetration, doors on all equipment should be left open.

Personnel Concerns

Personal exposure to heat sterilization temperatures is an important consideration. Employee training should cover common signs of heat exhaustion and heat stroke. The buddy system should be used, even when

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time spent in the heat sterilization area is only a few minutes.

Make sure emergency personnel have been notified about your operation and that emergency phone numbers are available, if needed.

Cost

Many variables must be figured into the cost of a heat sterilization, including the equipment, fuel, and many of the items already mentioned. In addition, facility downtime and labor should be considered. Labor from outside sources such as pest control, rental equipment and personnel, and in-house labor costs add up quickly. Depending on when a heat sterilization is done, weekend or holiday pay could be more. Facility production, sanitation, quality assurance, and maintenance personnel will be

involved.

Finally, monitoring devices must be purchased to ensure that proper heat sterilization temperatures have been reached.

For More Information

Dr. Bhadriraju Subramanyam at the Department of Grain Science and Industry at Kansas State University (KSU) recently conducted a heat treatment workshop at the KSU feed mill.

He is available at 785-532-4092 or by e-mail at bhs@wheat.ksu.edu to answer questions regarding heat sterilization, facility preparation, and the results that can be expected.

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GJ page 195