



# The **Extru-Tech**nician

Winter 2014

Extru-TechInc.com

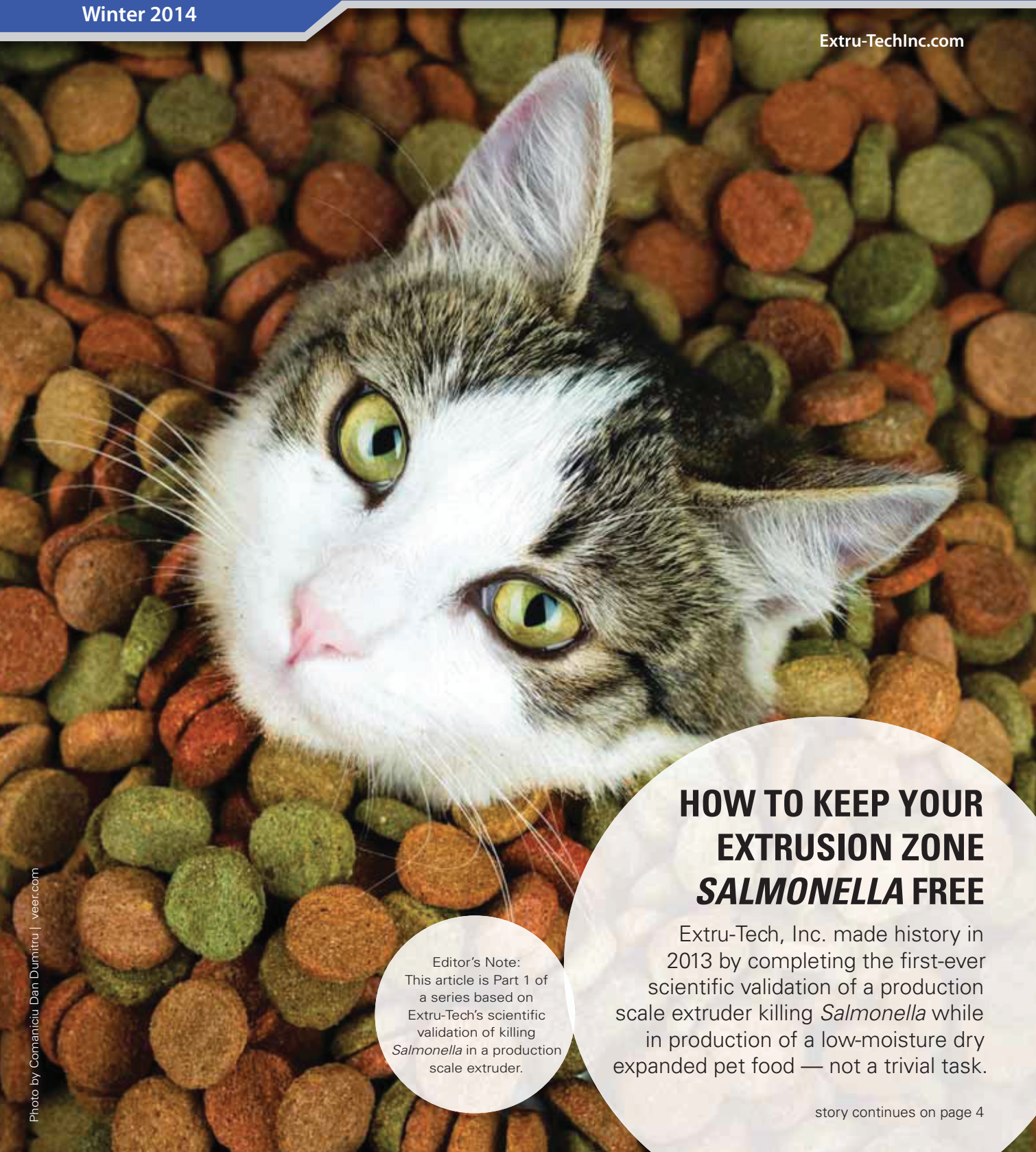


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Editor's Note:  
This article is Part 1 of  
a series based on  
Extru-Tech's scientific  
validation of killing  
*Salmonella* in a production  
scale extruder.

## **HOW TO KEEP YOUR EXTRUSION ZONE SALMONELLA FREE**

Extru-Tech, Inc. made history in 2013 by completing the first-ever scientific validation of a production scale extruder killing *Salmonella* while in production of a low-moisture dry expanded pet food — not a trivial task.

story continues on page 4

## HOW TO KEEP YOUR EXTRUSION ZONE *SALMONELLA* FREE

Regardless of scientifically validating killing *Salmonella* during the production process, one thing is certain ... we learned how to clean.

### Producing safe pet food

The team at Extru-Tech is always looking for new ways to improve our solutions to produce safe pet food. Through our validation efforts, we went well beyond the required three repetitions to ensure that the end result was applicable and practical for our clients and the pet food industry.



**Figure 1.**

ADP Inlet (AVT – Advanced Venting Technology) – Highlighted areas of concern for cleaning.

To scientifically validate killing *Salmonella* in a production scale extruder at every repetition we purposely contaminated the product stream, and the entire facility had to be sterilized before and after each repetition to ensure data integrity.

These tests required several thorough cleanings of the facility. The following sanitizing/sterilization tips are some of

the cleaning expertise we learned in this endeavor. This article is Part 1 of a multi-article series that will focus on the ADP (Aseptic Dual Preconditioner) or the legacy DCC (Dual Conditioning Cylinder.)

It must first be noted that the content of this article is not intended to be a direct replacement, or to act as the sole justification, for any modification to an existing or proven set of sanitary procedures. However, these steps have been scientifically validated in their effectiveness to kill *Salmonella*.

And secondly, it is important to understand the difference between clean, sanitary, and sterile.

- **Cleaned** – Free of visible soil, grime.
- **Sanitized** – a specific log reduction of targeted microflora was experienced
- **Sterilized** – 100% lethality of targeted microflora

The validated procedures discussed within this article produced a sterilization of the ETI ADP

### Practical *Salmonella* solutions

Within the process of developing a self-contained clean-in-place (CIP) system, we found a good, low-pressure and low-impact rinsing to remove all visible soil and feed accumulation is one of the more critical steps. Regardless of the effectiveness of sanitation chemicals, temperatures, or duration (temperature dwell time) of the heat cycle, if the targeted microorganisms are not penetrated then you will not succeed in killing them.

## Seven key areas to focus on:

1. Preconditioner inlet
2. AVT (Advanced Venting Technology), see Figure 1
3. Spare or unused injection ports (typically located in the lids)
4. Discharge downspout (just above the downspout diverter), see Figure 2
5. Undercarriage of motor and gearbox mounts, frame and supports, see Figure 2
6. Internal components of the downspout diverter, see Figure 3
7. Downspout diverter rest (used when not in operation)

In each of these seven areas, a high likelihood of buildup and feed residue exists from typical operations and unforeseen processing events. The removal of this residue should be executed in a manner that effectively cleans the area and does not transfer a possible contaminant to another processing zone.

The proper application of a thick foaming agent at a low pressure safely removes semi-loose residue. In addition to the obvious topical treatment, a significant penetration is incurred as the material is washed away while being mixed with the foaming agent.

If the low-pressure rinse is performed

**Figure 2.** ADP Discharge Flange – Highlighted areas of concern for cleaning.



**Figure 3.** ADP Downspout Diverter – Highlighted areas of concern for cleaning.



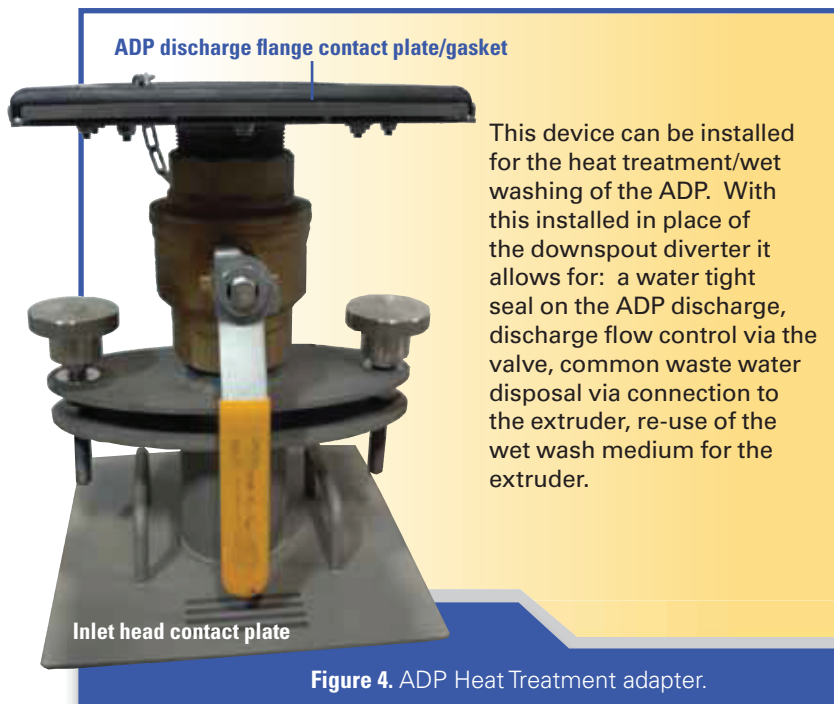
## HOW TO KEEP YOUR EXTRUSION ZONE *SALMONELLA* FREE

within 20 minutes of the foam application, it can be done with water. As the attachment time is expanded, the need for a deactivating rinse is necessary to ensure undue equipment corrosion does not occur. These time and step

time, and the chemical wash may need to be followed with a final rinse or the application of a stabilizing chemical.

For heat treatment, some additional hardware is required to seal the ADP and

control the discharge of cleaning/waste water as shown in Figure 4. The next step is to close off the discharge of the preconditioner (watertight). The preconditioner will need to be filled to a specific level by the injection of both water and steam. During this filling time, the preconditioner should be run at a low RPM to keep the water agitated for temperature equilibrium and to allow for a consistent exposure of all paddles to the water.



recommendations will differ depending on the actual chemicals/concentrations used in your process.

The final steps consist of a heat treatment or a chemical wash.

### **Chemical wash, heat treatment**

The chemical wash is simply a repeat of the foaming procedure with a change in the chemicals used. The foaming agent may need a substantial attachment

If appropriately outfitted with a discharge seal that contains a valve, it is recommended that as debris and buildup is loosened from inside the preconditioner that it is evacuated multiple times at short intervals (cycling the seal valve every few minutes). This prohibits the downspout from becoming plugged with debris and buildup material. This is an important consideration for heat treatment, as the temperature probe will become insulated from the

water (by the buildup of this loosened debris) and will not provide an accurate reading.

After a series of somewhat clean discharges have been verified, the preconditioner is ready to perform at an optimum sterilization level, and the temperature should climb to a minimum temperature (dependent upon duration of heat treatment).

It was determined during our trials that shaft speed and rotation both had an impact on the effectiveness of the heat treatment in terms of minimum dwell

time and temperature constraints. A recommended cycle should include a specific shaft speed and a minimum runtime in both a forward and reverse direction.

As a side note, a simple over-the-counter scented dishwashing soap added to the ADP before the heat treatment will help reduce staining and odor.

The next article in this series will discuss an appropriate sanitization procedure for the extruder.

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