

## **Advice 23-2015 of the Scientific Committee of the FASFC on a methodology for the verification and validation of alternative parameters for heat treatment of centrifuge and separator sludge from the processing of milk**

Regulation (EU) No. 142/2011 specifies the process parameters for the heat treatment of centrifuge and separator sludge from the processing of milk (category 3 material) and intended for animal feed. The Scientific Committee is asked to propose a methodology for the verification and validation of alternative process parameters resulting at least in an equal reduction of the risk reduction as the regulatory parameters.

The Scientific Committee has treated the dossier in three parts:

- Part 1: Verify whether the regulatory parameters are sufficient to ensure animal health;
- Part 2: Formulate alternative heating parameters equivalent to a heat treatment of 30 minutes at 80 °C and 60 minutes at 70 °C;
- Part 3: Suggest laboratory tests to verify the heat treatment.

### Conclusion part 1

The more relevant pathogens for animal health that may be present in centrifuge and separator sludge after heat treatment are the foot and mouth disease virus, the non sporulating bacteria *Mycobacterium avium* subsp. *paratuberculosis* and *Coxiella burnetii* and the sporulating bacteria *Clostridium perfringens* and *Clostridium botulinum*.

We can conclude, based on literature studies, that it is not certain that the foot and mouth disease virus is completely inactivated by a heat treatment according to the regulatory parameters of 30 minutes at 80 °C or 60 minutes at 70 °C for centrifuge or separator sludge produced on milk industry. The Scientific Committee proposes as a guideline for the destruction of the foot and mouth disease virus to follow the same treatments as those given in the legislation for milk powder for animal feed. These treatments contains, among others one of these treatments:

- a sterilization with an  $F_0$  value of at least 3,
- a HTST (*High Temperature Short Time*) treatment applied 2 times, or
- a HTST or UHT treatment combined with:
  - o a drying process combined with an additional heating to at least 72 °C,
  - o a pH decrease below 6.0 for at least one hour, or
  - o the condition that no outbreak of foot and mouth disease has been declared in the member state of origin at least 21 days before shipping.

Heat treatment according to the regulatory parameters (30 minutes at 80 °C or 60 minutes at 70 °C) is sufficient for the destruction of *Mycobacterium avium* subsp. *paratuberculosis* and *Coxiella burnetii*.

Heat treatment according to regulatory parameters is not sufficient to destroy spores of *Clostridium perfringens* and *Clostridium botulinum*. After the heat treatment, these spores can germinate and continue to grow when external conditions permit such growth. To exclude any risk of transmission of *Clostridium perfringens* and *Clostridium botulinum*, the growth of these pathogens should be limited after the heat treatment. This can be done by cooling, acidifying, drying the sludge after heating, or by limited the storage time before distributing to animals.

### Conclusion part 2

The Scientific Committee proposes to verify the equivalence of time x temperature combinations for the destruction of non-sporulating bacteria based on the destruction of *Mycobacterium avium* subsp. *paratuberculosis* and *Coxiella burnetii*, the most resistant pathogens to pasteurization, by applying the D and z value recommended in this advice.

It should be noted that a heat treatment of 30 minutes at 80 °C does not lead to the same microbial destruction as a heat treatment of 60 minutes at 70 °C.

Time (minutes) x temperature (°C) combinations leading to equivalent logarithmic reduction to a heat treatment of 60 minutes at 70 °C or of 30 minutes at 80 °C for *Coxiella burnetii*, *Mycobacterium avium* subsp. *paratuberculosis* and *Mycobacterium avium* subsp. *paratuberculosis* (strain ATCC 19698) are presented in this advice. In addition, equivalent treatments for a treatment of 25 seconds at 95 °C are given for extra information.

The applicable temperature, proposed by the sector to treat centrifuges and separators sludge, is 72 °C. At 72 °C, a heat treatment time of 35 minutes is needed to produce an inactivation of the three microorganisms considered equivalent to a heat treatment of 60 minutes at 70 °C on basis of knowledge available in the literature. Treatment of 17 seconds at 90 °C produces also an equivalent inactivation.

Time x temperature combinations which are proposed as equivalent in this advice are theoretical parameters. For application in practice, a period of heating and cooling could be considered which will further increase the safety of the product by the additional heat load on the product. This heating and cooling time can vary considerably depending on the used installation and the process (eg. batch or continuous process).

### Conclusion part 3

The most important parameters for the control of microbiological risks should be included in the HACCP plan of the operator. It is important to control the temperature and time during heat treatment and subsequent storage conditions if the circumstances in which the treated sludge is stored allow the growth of spore forming bacteria. To this end, the Scientific Committee recommends to apply the good manufacturing and good agricultural practices for the treatment and conservation of pasteurized product.

To verify the end product and validate the method, it is recommended to use *Enterobacteriaceae* as hygiene indicator. A (bio)chemical indicator could also be used to verify the heating. Possibilities include lactulose lactose ratio and the determination of lactoperoxidase activity. Before these indicators can be applied, they should be validated for the matrix to be treated and the heating conditions that are applied.

It is important to note that the data available in the literature that were used in this advice refer to the thermal resistance of pathogens in milk and not in centrifuge or separator sludge. Taking into account the fact that sludge are less rich in water than milk, it can be assumed that the micro-organisms are likely more resistant in sludge than in milk.

The full text is available on this website in dutch and in french.