



Maisons-Alfort, 18 August 2008

NOTE

**of the French Food Safety Agency (Afssa)
on treatments applicable to milk from animals in the event of clinical
suspicion and after confirmation of infection by the anthrax bacillus,
*Bacillus anthracis***

LE DIRECTEUR GÉNÉRAL

On 12 August 2008, the French Ministry of Agriculture and Fisheries issued an urgent request to the French Food Safety Agency (Afssa) further to request no. 2008-SA-0230 on the management measures of products from animals (milk and cheese) in the event of clinical suspicion and after confirmation of infection by the anthrax bacillus, *Bacillus anthracis*.

Reminder of the context

On 8 August 2008, Afssa issued an urgent opinion to assess the consumer health risk of products (milk and dairy products, meat) from animals in incubation or infected by anthrax (1). However, in view of the lack of available data on the minimum infectious dose by oral route for humans and the diversity of milk-based products, the emergency collective expert assessment group (Egroup) "Anthrax" limited its analysis to estimating the probability of *Bacillus anthracis* being present in actual milk and meat from animals in incubation or infected by anthrax.

Question raised by the Directorate General for Food (DGAI)

The DGAI would like to set up management measures based on the identified public health risk of milk and dairy products that would be required for animals presenting clinical signs, animals not presenting clinical signs in a holding placed under surveillance by prefectural decree or under a decree declaring infection and vaccinated animals, thereby avoiding the need to destroy products.

Expert assessment

The expert assessment was carried out internally and based on published **scientific evidence**. It was then submitted for review to the vice chairman of the Microbiology Scientific Panel and the experts of the Egroup "Anthrax".

1. Probability of *B. anthracis* being present in milk, data from the opinion of 8 August 2008 (1):

" a) Estimation of the probability of Bacillus anthracis being present in the milk of domestic ruminant animals in incubation or presenting clinical signs of infection by Bacillus anthracis
(...)

The "Anthrax" Egroup estimates that the probability of Bacillus anthracis being present in the milk of a cow infected by anthrax can only be considered negligible:

- *at least 48 hours before hyperthermia is observed if, before any clinical sign, hypothermia is detected;*
- *at least 72 hours before clinical signs are observed, if the cow expressed the disease clinically;*
- *at least 48 hours before death, if the cow dies suddenly without any prodrome being observed.*

Since development of the infection is generally much faster in sheep than in cows, the Egroup “Anthrax” considers that the estimation of the probability of *Bacillus anthracis* being present in the milk of cows in incubation or infected by anthrax as presented above can be extrapolated to sheep.

b) Estimation of the probability of *Bacillus anthracis* being present in the milk of ruminant animals belonging to an outbreak of anthrax, not presenting clinical signs and not having been vaccinated against anthrax

The Egroup “Anthrax” considers that a receptive and potentially exposed domestic ruminant animal (i.e. belonging to an outbreak of anthrax) can be infected at any time as long as exposure continues, and can therefore be in incubation of anthrax.

The probability of *Bacillus anthracis* being present in the milk of such an animal depends on how early the hyperthermia stage which it may enter is identified (see point 1.a of this opinion).

In these conditions, particularly attentive monitoring of animals while they are receptive, as they have not been vaccinated, would enable infection by *Bacillus anthracis* to be detected as early as possible.

c) Estimation of the probability of *Bacillus anthracis* being present in the milk of ruminant animals belonging to an outbreak of anthrax, not presenting clinical signs but having been vaccinated against anthrax, using an attenuated bacillus vaccine

The Egroup “Anthrax” believes that a domestic ruminant animal is protected by anthrax vaccination two weeks after correct administration of an attenuated bacillus vaccine, as long as there have been no elements that might prevent vaccine immunity (such as taking antibiotics).

It is estimated that the probability of *Bacillus anthracis* being present in the milk of ruminant animals belonging to an outbreak of anthrax, not presenting clinical signs and protected by vaccination against anthrax, is negligible.”

2. Current scientific knowledge concerning *Bacillus anthracis*

In addition to the usual measures of eliminating milk produced by animals presenting clinical signs, feverish, taking antibiotics or which have just been vaccinated, the following clarifications regarding *Bacillus anthracis* may provide technical support for the management measures planned on the site in question.

In epidemiological terms:

Contact with *B. anthracis* can cause skin infections in humans. Digestive (by ingesting) and respiratory (by inhaling) infections are not as common (2, 3, 5). The French Institute for Public Health Surveillance (InVS) recalls that some cases of skin anthrax caused by contact with sick animals have been reported in France since compulsory declaration was discontinued in 1986. The last 3 cases date back to 1997 (5). Anthrax by inhaling is rare: the last case, which proved fatal, dates back to 1996. No cases of digestive infection have been reported in France (5).

The consumption of undercooked meat is the main cause of digestive infection reported at international level (2, 3). Milk is not generally considered to be an infection vector of *B. anthracis* (9, 11).

There is little information on the infectious dose: Xu et al. (11) suggest that a high dose (10^6 spores) needs to be ingested to cause digestive infection by *B. anthracis*.

In physiological terms:

- Growth: *B. anthracis* is able to multiply at temperatures between 14 and 45°C (8).
- Sporulation: sporulation is swift, in less than 24 hours between 15°C and 41°C, in the presence of oxygen and in a moist environment (5, 9).

- Behaviour in milk:

B. anthracis can be found in vegetative form in milk following infection. Spores can nevertheless be found, but these come from the environment. Cold storage (4-5°C) favours neither the germination of spores nor the sporulation of vegetative forms (4, 9). Moreover, Bowen and Turnbull (4) found that vegetative forms of *B. anthracis* decrease in milk to become undetectable (reduction of 4 log₁₀ cfu/ml) after 7 hours at 37°C, or after 24 hours from 5°C to room temperature.
- Thermoresistance of vegetative and sporulated forms of *B. anthracis*

Milk pasteurisation (63°C for 30 minutes or 72°C for 15 seconds) reduces vegetative forms of *B. anthracis* by 4 log₁₀(cfu/ml) (7). Pasteurisation has no effect on sporulated forms (7, 11).

Another study (6) has shown that a ten-fold reduction in the number of *B. anthracis* spores in milk was obtained by a treatment at 70°C for 206 minutes, or at 90°C for 6 minutes.

Treating milk at 120°C for 16 seconds (sterilisation) reduces sporulated forms of *B. anthracis* by 6 log₁₀ cfu/ml (11). Treatment at 135°C for 1 to 2 seconds (ultra high temperature [UHT] treatment) is also effective on *B. anthracis* spores (10).

Note that the fat content of milk does not affect the effectiveness of heat treatment on *B. anthracis* (11).

Conclusion

Such is the analytical information that Afssa is able to provide as technical support in response to the urgent request of 12 August 2008 of the Directorate General for Food of the French Ministry of Agriculture and Fisheries on the treatments applicable to milk from animals in the event of clinical suspicion and after confirmation of infection by the anthrax bacillus, *Bacillus anthracis*

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