SciCom

SCIENTIFIC COMMITTEE
of the Belgian Federal Agency for the Safety of the Food Chain

OPINION 11-2018
Evaluation of an application for exemption for the use of non-potable water for malt production

(SciCom 2018/01)

Scientific opinion approved by the Scientific Committee on 4 June 2018.

Summary

Background & Terms of reference

In the production of malt, pumped well water is used that is stored in two different buffer tanks before being used in the production process. This stored well water is used during the first two process steps of malting, more particularly during steeping of barley and germination with formation of green malt. In addition to malt, pellets intended for animal feed are also produced as a by-product.
The microbiological quality of the well water generally satisfies the requirements for drinking water, as established in Royal Decree of 14 January 2002. The microbiological quality of the stored well water, however, shows regularly deviating values, despite the disinfection of this water with chlorine dioxide (ClO_2).

The Scientific Committee has been asked to give an opinion on the application for exemption concerning the use of this non-potable water for the production of malt. Specific exceptions are requested for following parameters: enterococci, *Escherichia coli*, coliforms, total plate count (22 ° C) and iron.
Since the Royal Decree of 14 January 2002 only applies to the tapping point (in other words, just before the water is used in the production process), this opinion only concerns the assessment of the stored well water.

Methodology

The opinion is based on a scientific evaluation -based on expert opinion- of the technical dossier provided by the operator.

Discussion of the technical dossier

The results in the technical dossier indicate a problem during storage of the well water in the buffer tanks. Too high iron levels and exceedances of the guidance values for indicator micro-organisms are observed, the latter despite disinfection of the stored well water with ClO_2. Presumably biofilms are

formed in the buffer tanks, as is also indicated in the technical dossier. The technical dossier refers to an interaction of the porosity of the tanks (concrete walls), the presence of blind spots and stagnant water. The microbial composition of these biofilms is not known.
The results also indicate an insufficient efficiency of the ClO_2 disinfection. This may be due to the presence of organic material in the water and the presence of biofilms, but may also suggest an insufficient mixing of the ClO_2 with the water. It is also plausible that the inadequate efficiency of ClO_2 disinfection is due to the too high iron content of the well water, reacting with ClO_2.

The high microbial values observed in the stored well water must however, be placed in perspective with the natural, high microbial load of the raw barley. The microbial population of barley together with the microbial population of the stored well water will affect malt quality, as well as the brewing performance of malt and the quality of the beer.

At the end of malting, the green malt is dried during kilning. During the last hour of kilning, the malt temperature is 75 to 80°C, which will stop further growth of thermophilic microorganisms, including germinated spores. However, non-germinated spores that are possibly present, are not inactivated or killed, neither are any microbial toxins.

The produced malt is not intended for direct consumption, but is used for the production of beer. During the beer production process the malt undergoes additional disinfecting steps as a result of boiling of the wort with hop. However, with respect to the argument that malt is a "ready-to-heat" product, it should be remarked that the temperature profile to which milled malt and wort produced therefrom are exposed during the brewing process, is brewery-dependent and that there is a trend to cook the wort less intensively.

Malt sprouts, malt dust and broken barley grains that are removed after drying, are used for the manufacture of pellets intended for animal feed. In other words, the pellets are a residual flow of the malt production process, which must also be considered for the assessment of the risk associated with the use of the stored well water. Urban water is used for the final manufacturing step of the pellets.

Despite the limited amount of analytical results in the technical dossier, but taking into account the microbial load of the raw barley and the impact of drying, the risk of using the stored well water appears to be 'low'. Nevertheless, the approach by which the operator determined the requested deviation from the applicable microbial standards, cannot be accepted. The proposed deviations correspond to an upward rounding of the highest value measured during the past years. In addition, it must be the intention to solve the contamination issue of the well water storage.
The analytical results are currently still to be tested against the criteria established in the Royal Decree of 14 January 2002. These criteria could be used as process hygiene criteria rather than as food safety criteria until the problem with the storage of well water is solved.
As far as the deviating values for iron are concerned, it is stated in the dossier that the iron present in the stored well water is not found in the malt. Moreover, the presence of too much iron in the malt would cause problems during the brewing process. Nonetheless, such high iron content inhibits the disinfecting by ClO_2.

Conclusions

Apart from the limited quantity of analytical results available in the technical dossier, but taking into account the microbial load of barley, the impact of kilning and further processing of the malt into beer, the risk associated with the use of the stored well water seems to be low. Nevertheless, the observed deviations are higher than the applicable standards. This problem needs to be addressed. The Committee therefore requests further follow-up of this dossier by the FASFC and recommends:

- to increase the analysis frequency of (the well water and) the stored well water, preferably to a monthly monitoring, and this in view of the delivery of more analytical results and risk management;
- to provide control measures in case of a contamination above a set limit that progressively becomes stricter;
- to reduce the iron content of the well water before storage, e.g. with the aid of aeration and sand filtration;
- to optimize ClO_2 dosage and mixing;
- to increase the refresh rate of the stored well water (so as to prevent, among other things, the formation of biofilms); and
- to continue to look for the cause of the problem observed in the stored well water.

Key terms:
non-potable water, exemption, malt production