This is provisional English translation of an excerpt from the original full report.

Risk Assessment Report

Aqueous Solution of Hypobromous Acid

(Food Additives)

Food Safety Commission of Japan (FSCJ)
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ABSTRACT

FSCJ conducted a risk assessment of an aqueous solution of hypobromous acid (CAS No. 13517-11-8, as hypobromous Acid, HOBr), an additive used as a fungicide for meat surface, based on results from studies described below.

The data used in the assessment include genotoxicity, repeated dose toxicity, carcinogenicity and reproductive and developmental toxicity of 5,5-dimethylhydantoin (DMH) and bromides. DMH is a degradation product of 1,3-dibromo-5,5-dimethylhydantoin (DBDMH). An aqueous solution of hypobromous acid is made from an aqueous solution of DBDMH, and thus contains DMH as degradation product.

After meat surface is treated with aqueous solution of hypobromous acid, hypobromous acid is soon degraded into bromides due to the presence of organic substances on the meat surface. DMH and bromides may thus remain on the surface. In addition, FAO/WHO (2008) has also evaluated trihalomethanes (BDCM, DBCM and bromoform) and bromic acid.
Accordingly, FSCJ decided to comprehensively evaluate the safety of an additive, aqueous solution of hypobromous acid, by examining the results from various studies on DMH and bromides.
In regard to trihalomethanes (BDCM, DBCM and bromoform) and bromic acid, FSCJ has conducted the assessments in 2009 and 2008 respectively, and there has been no further findings relevant to safety concern since then, according to the applicant survey.

1. DMH

   Toxicokinetics of DMH indicate that DMH is absorbed rapidly, almost unmetabolized, and excreted intact mainly in urine.

   DMH is considered to have no genotoxicity relevant to human health.

   On the basis of the data on acute toxicity, repeated dose toxicity and reproductive developmental toxicity of DMH, FSCJ determined no-observed-adverse-effect level (NOAEL) of 100 mg/kg bw per day for DMH from the developmental toxicity in rabbits. FSCJ also judged that DMH has no carcinogenicity.

   Taking into consideration of the estimated daily intake (EDI) of 0.014 mg/kg bw per day for DMH in Japan, FSCJ judged that the ADI for DMH need to be specified. Consequently, FSCJ specified an acceptable daily

intake (ADI) of 1 mg/kg bw per day for DMH, applying a safety factor of 100 to the NOAEL of 100 mg/kg bw per day observed in the developmental toxicity study in rabbits.

2. Bromides

Toxicokinetics of bromides indicated the following points.

It remained in blood for long periods and distributed to the central nervous system and thyroid gland, but the tissue levels of bromides were lower than that in blood. Bromide transferred from a dam animal to the fetus through placenta. In addition, a tendency of the lower chloride intake, the higher serum concentration of bromide, was observed suggesting an influence of chloride levels to the excretion of bromide.

Bromides is judged to have no carcinogenicity relevant to human health.

FSCJ considered the NOAEL of bromide as 9 mg/kg bw per day (as bromide ion) in human intervention study, based on the data on acute toxicity, repeated dose toxicity, reproductive developmental toxicity and human data of bromide. Regarding to the carcinogenicity, FSCJ judged it difficult to evaluate the carcinogenicity from the result of the study, due to unavailability of the detailed data and of the single dose experiment.

Considering EDI of 0.018 mg/kg bw per day for bromide (as bromide ion) in Japan, specification of ADI for bromide is necessary. Consequently, FSCJ specified ADI of 0.9 mg/kg bw per day for bromide, applying a safety factor of 10 to the NOAEL of 9 mg/kg bw per day observed in human intervention study.

3. Trihalomethane and bromic acid

FSCJ conducted a safety evaluation of only bromoform among trihalomethanes, since BDCM and DBCM were below the detection limit in the feeding study.

FSCJ determined EDI of bromoform derived from an additive use of aqueous solution of hypobromous acid to be 0.214 μg/person per day, on to 0.0039 μg/kg bw per day, which was below the TDI of 17.9 μg/kg bw per day determined by FSCJ in 2009.

FSCJ judged EDI of bromic acid derived from an additive use of aqueous solution of hypobromous acid to be 0.037 μg/person per day, equivalent to 0.00067 μg/kg bw per day. According to the risk assessment of bromic acid conducted by FSCJ in 2008, the dairy intake of bromic acid equivalent to carcinogenic risk level calculated based on 10^{-4}, 10^{-5} and 10^{-6} were 3.57, 0.357 and 0.0357 μg/kg bw per day respectively. The EDI of bromic acid derived from an additive use of aqueous solution of hypobromous acid is thus considered to be below the intake equivalent to the carcinogenic risk 10^{-6}.

4. Aqueous solution of hypobromous acid used as an additive

FSCJ concluded that an aqueous solution of hypobromous acid is of no safety concern relevant to human health as long as used appropriately as an additive, based on the findings mentioned above.