Development of a reference procedure for the detection of specified risk material (SRM) in meat products / meat and bone meal

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Introduction

In the present research project a reference procedure for the detection of tissues of the central nervous system (CNS) in meat products and meat and bone meal (MBM) was developed, optimized and evaluated. The aim of the project was to optimize the control of the community regulations which were established for the minimization of the human BSE exposition risk via the food chain. Moreover, such a procedure would considerably contribute to the control of community regulations on food labelling.

Available immunochemical procedures for the detection of CNS and food products do not facilitate the detection of specified risk material (SRM) as defined in directive 999/2001/EC. Species and age of the CNS is not detectable. Further, there is a considerable instability to heat treatment, thus MBM cannot be analyzed and sensitivity is reduced in meat preserves.

Methods

The procedure is based on the detection and quantification of certain fatty acids (CNS-FA) and their patterns. They can be extracted from the complex lipid fraction of the CNS and detected by means of gas chromatography and mass spectrometry (GC-MS). The project comprised the following steps: Production of standard materials (meat products, MBM) and their quality control, the optimization and characterization of the analytical quality of the procedure, the establishment of a data base for CNS fatty acid markers in various animal and plant matrices, studies on the identification of species and age and quantification of the CNS in various products, the definition of a standard operating procedure and the validation of the procedure in internal and external blind-tests.

Results

The analytical strategy of the GC-MS procedure we developed is based on the following analytical steps: (1) Identification of the presence of CNS, (2) identification of the CNS-species and classification of the CNS-age, (3) quantification of the CNS content using our data base on CNS fatty acid.

For the identification of CNS positive samples cut-off values had to be applied as traces of all of the so called CNS-specific fatty acids could be detected in many matrices relevant in meat or MBM technology. Thus, the realistic limits for CNS in meat products are in the range of 0.2% to 0.5% CN. The CNS markers proved to have an extraordinary heat stability. They

were quantitatively recovered under conditions which exceeded by far the thermal process of MBM production (133 °C, 3 bar, 20 min). In a blind-test which was conducted with samples produced externally (the composition of the samples was unknown at the time of analyses) all (100%) of the samples containing CNS above the cut off value of 0.2% CNS were correctly classified as pertaining to: (1) the presence of CNS, (2) the CNS-species, (3) the CNS-age group (i.e. the animal and age at time of death from which the CNS was derived from). Three different heat treatment conditions (85 ^{o}C, 30 min; 115 ^{o}C, 25 min, 2 bar; 133 ^{o}C, 40 min, 3 bar) showed no detectable effect. Also, the results of the CNS-quantification were satisfying albeit with some minor deviations.

Conclusion

The procedure which was developed in the present research project facilitates the identification of animal species and age from which the analyte (CNS) was derived from. The analytical quality of the GC-MS procedure is not affected by heat treatment. Overall the procedure is highly superior to presently available immunochemical methods. Thus, its application as a reference procedure in official food control for the detection of CNS in food products and MBM can be highly recommended. However, further studies are needed to increase the data base for fatty acids and in order to establish inter laboratory precision.

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