

# OVERVIEW OF STUDY INTO INJECTION POWDERS USED AS WATER RETAINING AGENTS IN FROZEN CHICKEN BREAST PRODUCTS

## Background

1. Ingredients used to retain added water in meat products can include salt, polyphosphates, carageenans and hydrolysed proteins. Use of these ingredients as water retaining agents is legally permitted but the meat products must be correctly labelled. This study focussed on water retaining agents derived from hydrolysed animal proteins and used in chicken injection powders.

2. Injection powders made up as brine are used to retain added water in a range of frozen chicken breast products prepared on multi-needle injection machines. These chicken products are sold mainly into the catering sector through wholesalers. The attached report presents the findings of an exploratory study, applying a range of analyses to samples of these injection powders to determine their composition and enable identification of the species origin of the proteins present.

3. The study follows on from earlier Agency surveys of frozen chicken breasts with added water and other ingredients which highlighted issues with undeclared hydrolysed collagen proteins in some chicken samples. Collagen is the main protein of connective tissue in animals and the most abundant protein in mammals. DNA analysis from the earlier surveys revealed the most likely source of the hydrolysed protein to be beef or pork collagen.

4. Although labelling of these products has improved since the Agency's original work an investigation into these powders took place for two main reasons. First, to assess whether "cutting edge" scientific methods recently developed under the Agency's authenticity programme could be applied to identify the ingredients used in the injection powders, and the species origin of the hydrolysed proteins. Secondly to establish whether the nitrogen content of the injection powders was disguising higher amounts of added water in chicken than declared.

## Sampling and Analysis

5. It is difficult to determine the composition of injection powders once they have been injected into chicken breast products, this study therefore focussed on direct analysis of the powders, where the ingredients were more concentrated. Five samples of injection powders (A1, A2, B1, B2 and C) were taken directly from three separate manufacturers who use the powders to produce frozen chicken breast products with added water and other ingredients.

6. The raw material specification of all the powders, and the list of ingredients declare the source of the protein as hydrolysed chicken or poultry protein. In addition to the powders, three different frozen chicken breast products, labelled as containing hydrolysed chicken protein were purchased from a wholesaler.

7. The powders were analysed for nitrogen content and the amount of hydrolysed collagen protein determined. Real-time Polymerase Chain Reaction analysis was carried out to determine what species DNA were present in the powders. Two different proteomic approaches were applied to the powders, to permit identification of the probable animal source of the hydrolysed protein by identification of species-specific peptides (protein fragments). Thaw drip exudates from the chicken samples were also subjected to the same proteomic methods to see whether the animal origin of the injected hydrolysed proteins could be identified in chicken samples.

## Results

8. The main conclusions of the study were as follows:

- There was no evidence that the nitrogen content of the powders was disguising more added water than declared.
- The only proteins identified in the powders were from hydrolysed animal collagen.
- Proteomic analysis indicated the presence of undeclared mammalian collagen proteins, not avian in origin, present in all five samples of powders analysed.
- Two independent proteomic approaches suggest the presence of bovine collagen peptides in all five powder samples. In addition, both methods failed to identify any avian collagen-specific peptides in powder samples A1 and A2, suggesting these powders were not from a poultry source.
- An avian/porcine peptide was detected in powders B1 and B2 using one of the proteomic methods. Therefore it is not possible to specifically confirm, either the absence of avian collagen peptides in these powders, or presence of porcine collagen peptides in powders B1 and B2 using this method.
- However, the second proteomic approach identified a small number of porcine peptides in powders B1 and B2 that were not present in other animals commonly used for food in the sequence databases.
- No porcine-specific peptides were identified in samples A1, A2 and C by either proteomic method.
- Analysis of three frozen chicken breast samples indicated one of these contained undeclared non-avian, mammalian collagen peptides. Both proteomic methods indicated the presence of bovine collagen-specific peptides in this chicken exudate. No porcine collagen-specific peptides were identified.
- Real-time PCR analysis was positive for chicken DNA in all powder samples tested and negative for beef and turkey DNA. Analysis of powder B1 gave a positive signal for pork DNA.

## **Follow-Up**

9. The base hydrolysed protein in the powder samples are manufactured outside the UK. Reports of the results were sent to the enforcement authorities of the relevant Member States where the powders were produced in order to address the issue of undeclared proteins at source. Following a request from the Agency an inspection of the factories was carried out. The Agency is following this up in discussion with the relevant enforcement authorities. Given the findings of the study have implications for other Members States, as well as the UK, we have informed the Commission of the results of the study. Further meetings with the Commission and relevant Member States are planned to address this issue in more depth and present further data.

10. Although proteomics analysis is an established technology this was a novel application of a proteomic approach to this type of powder sample. The analytical methodology was therefore refined and developed as the study progressed. The method requires further development before it can be routinely applied to analyse samples of this type. We are therefore discussing with the researchers what further work may be needed to develop a standard proteomics method to determine the species origin of hydrolysed proteins used in injection powders.

## **Conclusions**

11. This study of a small number of injection powders used in chicken breast products has indicated the presence of undeclared, mammalian peptides i.e. from a non-poultry source in the samples analysed. The analyses applied indicate the presence of bovine collagen in all the powders sampled and suggest the presence of porcine collagen in some of the powders. Certification accompanying the powders claim they are produced only from a poultry source, however the analytical results suggest this claim could not be substantiated.

In line with our rules on publication of publicly funded studies, we are reporting the findings of this ongoing study to inform consumers, provide advice in light of the findings and reassure them that we are continuing work in this area to resolve the issue.

Whilst the results published today are a full picture of the findings, the Agency has omitted certain identifying details in relation to the specific products and companies involved. This is to ensure that any possible enforcement actions or follow-up investigations are not compromised.

It should be noted that this study does not raise any food safety implications.