

Using PIXE method to determine the origin of commercial feathers

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Abstract

If you have less knowledge on the quality of duvet, or feather comforter, and are going to buy one made in Europe, such as France, Poland or Iceland, you are in a high risk of being swindled. In May 2016, the Japan Feather Products Cooperative association (JFPC) sent its member companies a warning that production areas seem to be falsified in more than half of feather comforter that list their feathers as being produced in France. However, the organization has not yet to inform the public of the suspected falsification, although products with false labeling are suspected to be circulating in large quantities in Japan.

The major reason having difficulty in supervising the falsification is because it is difficult to scientifically confirm whether feathers are actually produced in those Europe countries. Various methods are studied worldwide to identify the breeding area of feathers. Among them, the stable isotope analysis is currently most promising and actually used in many companies. The stable-isotope analysis of feathers is useful to distinguish breeding origins of sea birds since it represents eating habits of them. The stable isotope technique uses the major elements such as carbon (C), hydrogen (H), nitrogen (N), and oxygen (O) that constitutes the protein of feathers. However, the results obtained from applying the technique is not generally recognized as very reliable among feather companies. In effect, a generally accepted method to

identify the breeding country of feathers is not yet developed.

It seems that the insufficient ability of the stable isotope technique comes from using only major elements. According to our experiences in studying the risk of atopic dermatitis using hair minerals of mothers and infants, minor, trace or ultra-trace elements could be useful since those minerals in feathers should also represent eating habits. To investigate into the ability of those minerals, JFPC presented us with 1g of down feathers from each of four breeding areas; Poland, Taiwan and two areas in France. We sampled 80 down balls from each area and measured concentration of 40 minor, trace or ultra-trace elements by PIXE method. This paper describes the results obtained from statistical analysis of the mineral concentrations to distinguish between those breeding areas.