

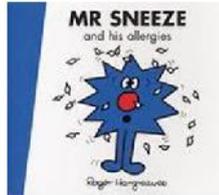
# A New Method for Assessing Feather and Down Serum Protein Contamination (#1749)

A. Southey PhD\*, T. Yeomans PhD\*, J. McKeon M.D.\*\* and E.B Mitchell M.D.\*

\*airmid healthgroup, Trinity Enterprise Campus, Dublin 2, Ireland. \*\*Allergy Standards Limited, Trinity Enterprise Campus, Dublin 2, Ireland

## Introduction

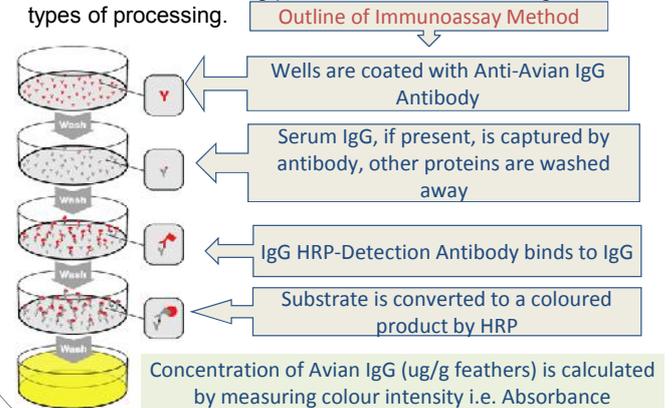
In the past, allergy to feather was considered very common<sup>[1]</sup>. It is now known to be quite rare<sup>[2]</sup>. The reactions initially seen are recognized as being triggered by contaminants including feather mites, other cross reacting mites and avian serum proteins. All are highly reactive through allergenic and hypersensitivity mechanisms<sup>[5-7]</sup>.



Over recent years commercial processing of feather and down has progressed greatly and remove these contaminants. However, it is crucial to have methodologies that determine whether this processing, highly variable on a worldwide scale, has been effectively performed. Where allergen accumulation is concerned, the integrity of the barrier function of the ticking fabric represents the key consideration.

## New Methodology – Serum Protein Based

Feather-associated proteins, including serum components are extracted from the Feather/Down material by standard methodology. The extracts are analysed for Total Protein and for Avian IgG content, using a newly developed immunoassay. Comparisons can be made between feathers before and after the commercial washing process as well as following different types of processing.



## Existing Testing Methodology

The feather and down industry currently relies upon turbidity and oxygen number as being indicators of adequate cleanliness. Unfortunately relevant quantities of contaminants may remain, in spite of these levels being deemed acceptable. The methodology for determining oxygen number was developed in 1928 by H.F. Knight and is based on a color change following a titration (Fig 1). As such, this is very much an indirect method to determine the cleanliness of feather and down and while it may measure allergen as a component of organic material present, an improved method which is more sensitive is required.

Turbidity is also an indirect testing method for determining cleanliness of feather and down, and measures both organic and inorganic materials. Two methods may be used to measure turbidity, using a glass cylinder (similar to Fig 2) or an automated nephelometric turbidity unit (NTU) meter.

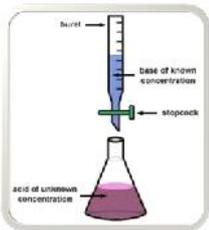


Figure 1 Oxygen Number



Figure 2 Turbidity Test

According to industry:

<4.8 = 'Hypoallergenic'

>550 = 'Hypoallergenic'

## Existing Vs New Methodology

Feather and down products, pre- and post-wash, were analysed using the industry standard methodology. This was compared to the new immunoassay-based method. The results are detailed below:

Sample	Oxygen No.	Turbidity	Avian IgG (µg/g)	Protein (mg/g)
Unwashed 1	24	73	42.41	2.5
Unwashed 2	26	45	75.31	3.08
Unwashed 3	26.4	60	12.31	1.88
Washed 1	4	550+/1000+	1.06	0.53
Washed 2	4.8	550+/1000+	0.05	0.55
Washed 3	2.6	1000+	2.42	1.39

## Discussion and Conclusions

All the washed samples listed above would be classified as 'hypoallergenic' by the feather and down industry. While the term 'hypoallergenic' has no medical definition, it is recognised by consumers as being a measure of a product's ability to elicit an immune response.

As can be seen from the table, although the washed samples would all be viewed as being of a similar quality, the difference in IgG levels between the lowest and highest figures is nearly 50-fold.

- Present methodologies to determine whether allergens are present on feather and down products are not sufficiently sensitive.
- The presented method allows manufacturers, for the first time, to be able to measure accurately the allergenic content of their product.
- Based on data obtained to date, the Avian IgG immunoassay is an important tool for assessing the level of bird allergen contamination of feathers, and hence can be used to assess the effectiveness of the commercial washing process for removal of allergens.

## References

1. Unger, L and Harris C. (1974). Steppingstones in allergy. *J Allergy* 32: 17-26.
2. Kilpio, K, Makinen-Kiljunen, S, Haahtela, T and Hannuksela, M. (1998). Allergy to feathers. *Allergy* 53: 159-64
3. Dryer, AL, Chandler, MJ and Hamilton, RG. (2002). Dust-mite allergen removal from feathers by commercial processing. *Ann Allergy Asthma Immunol* 88: 576-7
4. Colloff, MJ, Merrett, TG, Merrett, J, McSharry, C and Boyd, G (1997). Feather mites are potentially an important source of allergens for pigeon and budgerigar keepers. *Clin Exp Allergy* 27: 60-7
5. Kemp, TJ, Siebers, RW, Fishwick, F, OGrady, GB, Fitzharris, P and Crane, J. (1996). House dust mite allergen in pillows. *BMJ* 313: 916