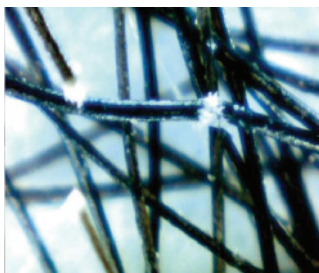


# Zero complaints – the ultimate goal for hair contamination is attainable

by Richard Burnet, Aburnet, Walter Street, Draycott, Derbyshire DE72 3NU, UK.

When big food retailers discover hair contamination they fine the food and drink manufacturers who make the store's own-label products. They even de-list the very worst offenders. It is a big incentive to manufacturers to work harder to reduce the numbers of complaints, but it is a complicated challenge.

A food production worker can boast of having between 100,000 to 145,000 scalp hair-shafts at any given time. An average of 40-130 hair-shafts will be lost each day and be a significant risk of food contamination. In a food factory of 100 workers between 4,000 and 13,000 hairs each day need to be contained to protect the consumers and the retailer's reputation and the manufacturer's business.



**Trichorrhexis Nodosa photomicrograph (x50). The high spots indicate the points of eventual severance (B. J. Stevens).**

When workers started to wear head covers such as mob caps and hairnets it helped to control the released hair. Yet it has not been as effective as food makers hoped and reports and fines continued to happen.

Aburnet Ltd has been working with respected scientists at the University of Bolton on a £250,000 research project. The knowledge and data has been gathered in a white paper entitled 'Target Zero Hair Complaints' and it is now available for readers to access online ([www.aburnet.co.uk/target-zero-hair-complaints](http://www.aburnet.co.uk/target-zero-hair-complaints)). It has been inde-

pendently reviewed by Professor Barry Stevens MA FTTS, President of the Trichological Society.

The research discovered a wide range of factors that influence the rate of hair loss; natural and environmental factors that can reduce the effectiveness of some head covering and causes of workers discomfort that can significantly boost the numbers of hairs that they shed.

Aburnet developed products and methods of covering as the research progressed and trials with close assessment of the test candidates produced hundreds of pieces of data that demonstrated the most effective hair control methods and means.

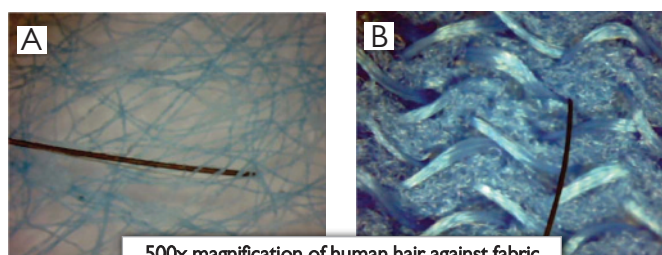
Professors Subhash Anand, Subbiyan Rajendran and Dr Karthick Kanchi Govarthanam contributed significantly to the research report and the white paper is rich in detail and explanation that will help food and drink producers to understand the causes of hair shedding and the ways and means of achieving zero or near zero contamination.

The issue of hair contamination is not just a natural phenomenon of hair shedding but also a direct result of modern hair styling.

According to Professor Barry Stevens, FTTS, President of the Trichological Society 2014-16:

- Higher rates of hair shedding can be attributed to poor diet, reduced iron levels, post natal alopecia, fever or numerous other medical conditions.
- Hair damage is common – due to

**Left (A) a 12gsm mob cap. Inherent gaps in material easily allow hair to protrude. Right (B) KleenCap breathable hair barrier fabric restricts hair penetration. StayCool technology transports moisture through the fabric to evaporate into the atmosphere to help keep workers cool. Antimicrobial inhibits the multiplication of bacteria and fungi such as Gram positive staphylococcus.**



500x magnification of human hair against fabric



**KleenCap.**

use of high temperature thermal appliances employed in hairdressing procedures.

- Chemical processes (colouring, permanent waving, relaxing or straightening) are potentially damaging by compromising the protein structure of the hair-shaft.
- Levels of such damage will be individually unique.
- Current conditioners do not repair hair-shaft damage but are useful in providing temporary improvement to lustre, feel, and drag reduction during routine grooming.
- The above processes compromise hair-shaft elasticity and tensile strength leading to such conditions as tricoptilosis (splits) or bubble hair syndrome (blisters) and/or trichorrhexis nodosa (node formation) with possible severance at some point along their axes.

It is the daily on-going shedding/severance of hair-shafts that will be found to contaminate food and therefore need to be effectively contained.

Professor Stevens adds: "If we accept that hair-shaft shedding is a constant occurrence it is possible that 13-43 hairs could be shed from the scalp of each employee during an eight hour period. This equates with 1,300-4,300 hairs per 100 people.

"These figures can be significantly augmented by thermal injury and severance (following exposure to excessive heat from hairdryers, curling tongs etc) and chemical insult (bleaching, colouring, permanent waving, chemical relaxing or chemical straightening).

"The figures will be further increased by the daily losses of beard, nasal and ear hairs, eyebrows and eyelashes."

## Why contain hairs?

Whilst daily grooming will remove many of these shed and damaged loose hairs, the fact that:

- Clearly not all shed and damaged 'loose' hairs are removed by personal grooming.
- Many hair styles are not brushed or combed but 'distressed' leaving the shed and damaged loose hairs on the head in addition to those shed during the work activity itself.
- Drying wet hair with high temperature settings on hair dryers and styling with curling tongs damages hair causing it to break off.
- Chemical treatments such as colouring, chemical straightening and perming damage hair causing it to weaken and frequently break off prematurely.
- Individual's habits vary greatly with some people showering before sleeping rather than just before work.
- Many people do not wash hair daily.
- Hair shedding is occurring all the time, including during the work shift itself.

These shed and broken 'loose'

*Continued on page 13*

Outer head covering	University of Bolton findings				Additional hair containment technology			Optional anti-microbial technology	
	Actual av. quantity protruding hairs per use	Factored av. quantity protruding hairs per use	Hair containment improvement factor	Short hair protruding over long hair multiplier	HairTite	HairBarrier	Staycool	HairTite	KleenCap
Under covering = None									
12gsm mob cap	74*	85	0.0	2.3	X	X	X	X	X
KleenCap Standard	35	35	2.4	2.0	X	✓	X	X	X
Under covering = HairTite Standard									
12gsm mob cap	21	21	4.0	1.6	✓	X	X	✓	X
KleenCap Standard	20	20	4.3	1.7	✓	✓	X	✓	X
Under covering = HairTite HiCare									
12gsm mob cap	15	15	5.7	1.8	✓✓	X	X	✓	X
KleenCap Standard	15	15	5.7	1.7	✓✓	✓	X	✓	X
Under covering = HairTite Standard									
KleenCap Max	11	11	7.7	1.6	✓	✓✓	✓	✓	✓
Under covering = HairTite HiCare									
KleenCap Max	8	8	10.6	1.6	✓✓	✓✓	✓	✓	✓

\* Where mob caps ballooned away from the head, protruding hairs could not be accurately counted. The University therefore factored the figure to account for the percentage of the head zones where the mob cap ballooned away from the head.

**Table 1. Research into different head coverings undertaken by the University of Bolton, England, found marked differences in performance.**

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hairs will be disturbed and potentially contaminate production during a working shift due to the following reasons:

- The wearer scratching his/her head, the frequency of which can be increased where workers are hot due to either the ambient tempera-

ture, higher levels of work activity or discomfort from inappropriate head coverings themselves

- General movement during the work activity
- Whether standing or seated the head is usually tilted down towards the work activity increasing the exposure of shed or damaged hair from the crown due to gravity
- The abrasion of any head covering over hairs that are not lying flat

It is therefore no surprise that hair is potentially a significant contaminant of food.

### A microbial threat?

Whilst it is known that the scalp can be a haven for bacteria (especially the relatively harmless Malassez Furfur (Pityrosporum Ovale), Professor Stevens is unable to eliminate hair-shafts as disease carriers

(Staphylococcus aureus). However, hand contact with the scalp during food production is probably more likely to act as a carrier therefore complete head hair covering is recommended.

"I cannot ignore the potential for contamination via beard hair as this can be an involuntary target of touch by infrequently washed hands. Covering the beard with net is therefore a wise precaution," Professor Stevens added.

"Food production personnel can effectively prevent scalp hair contamination through the wearing of HairTite HygieNets and KleenCap-Max, with HairBarrier products such as Neck Shield – which can be worn in multiple ways to cover beard, face and nasal hair as desired, or Beard Shield, or KleenCap-Max Neck Guard (covering scalp and beard hair) if new each day or cleansed with HairGon after a single day's

wear to remove any residual hair-shafts caught in the material. However eyebrow, eyelid, ear and facial hair cannot be ignored – their prevention being more problematic".

Aburnet's new KleenCap Max is available with an antibacterial property. The product has been tested to inhibit the growth of both Gram positive and Gram negative bacteria MRSA and E. coli with 99.9% effectiveness after 15 washes in HairGon – the advanced formula wash additive that has been tested by the University of Bolton, England, to dissolve residual hairs during the wash.

KleenCap-Max with antimicrobial, HairBarrier and StayCool technologies has been independently tested as being both effective at containing shed and damaged hairs, keeping staff cool and comfortable and being cost effective in use. ■

