



# How to evaluate the sensory quality of new ingredients from animal side streams

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## INTRODUCTION

Side streams from the meat industry are a potential source of high-quality proteins for human consumption. Until now, the Danish meat industry has primarily attempted to upgrade the side streams through hydrolysis, but by that process the proteins lose their functionality, and bitter peptides are often formed. In this study, the sensory quality of soluble proteins extracted from pig lungs, were evaluated. Prior to extraction, the lung tissue was prewashed with water to reduce the amount of coagulated blood and to minimise the red colour as well as iron concentration. After extraction, the liquid protein fraction was concentrated using ultrafiltration.

## AIM

The aim of the study was to investigate how pre-treatment with water (prewash) and ultrafiltration affects the sensory quality of extracted protein from pig lungs.

## METHOD

Protein from minced lung tissue (with or without prewash) was extracted (pH 9.5 with a ratio of 1:5 for 1 hour at 10°C), and half of the samples were concentrated to 8-10% protein using ultrafiltration with a cut-off value at 25 kDa. A dry protein flour was obtained by freeze drying. The iron content was analysed with ISP-MS based on ISO 17294m:2016. The colour of the freeze-dried protein was analysed by CIELAB colour space (VideometerLab).

The sensory profiling of the lung proteins was performed using a neutral bread matrix with 2% lung protein added. The breads (1000 gram) were baked in a convection/steam oven at 220°C for 30 minutes. To the reference sample, rice flour was added instead of lung proteins. The samples were cut into a size of 25x25x10 mm leaving out the crust and were evaluated using a 15 cm unstructured line scale.

A sensory panel (n=7) performed the sensory evaluation with three replicates based on ISO 4121:2003 and ISO 13299:2016.

Table 1. Overview of the lung protein sample names

	+C	-C	+R	-R
Prewashed	Yes	No	Yes	No
Concentrated	No	No	Yes	Yes

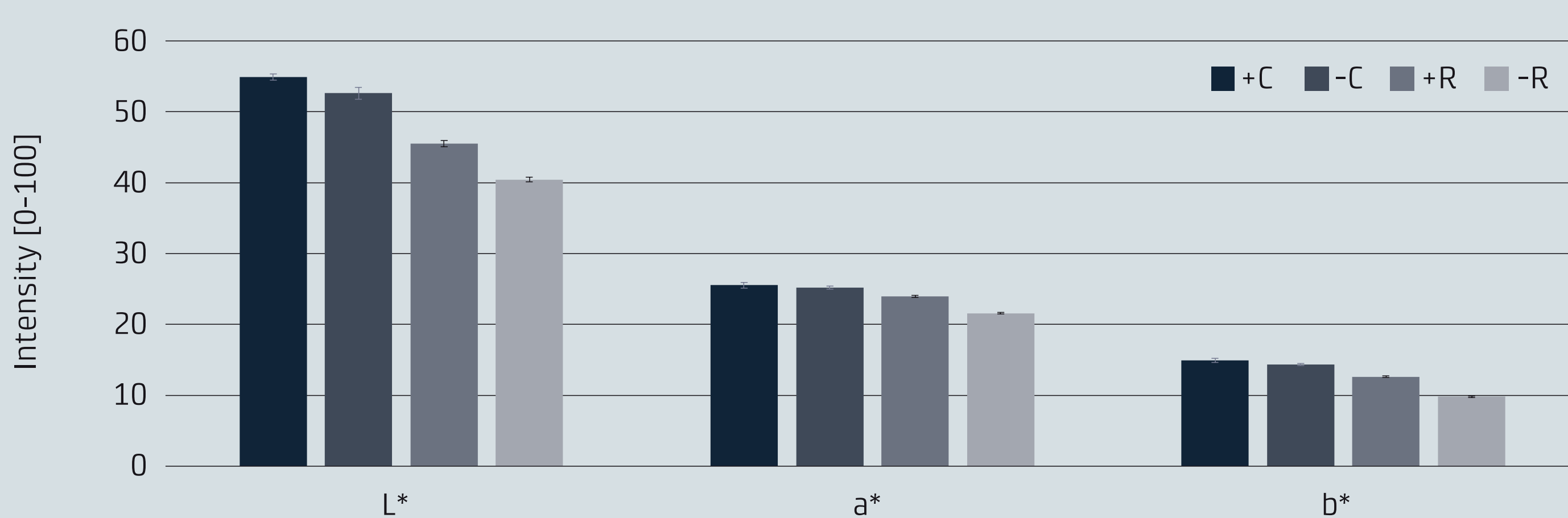


Figure 2. L\*, a\*, and b\* values for freeze-dried lung protein

## CONCLUSION

The study showed that the prewash of the lung tissue before extraction resulted in a reduction of the colour to a degree, which is reflected in a food matrix, when added in a concentration of 2%, while the taste and flavour was not affected by the lung protein. Furthermore, the prewash reduced the iron content.

The sensory profile showed that independent of pre-treatment and ultrafiltration, the protein did not contribute with umami taste, rancidity or offal related flavours such as iron, metallic or bitterness. The membrane filtration influenced the colour of the protein but not the flavour.

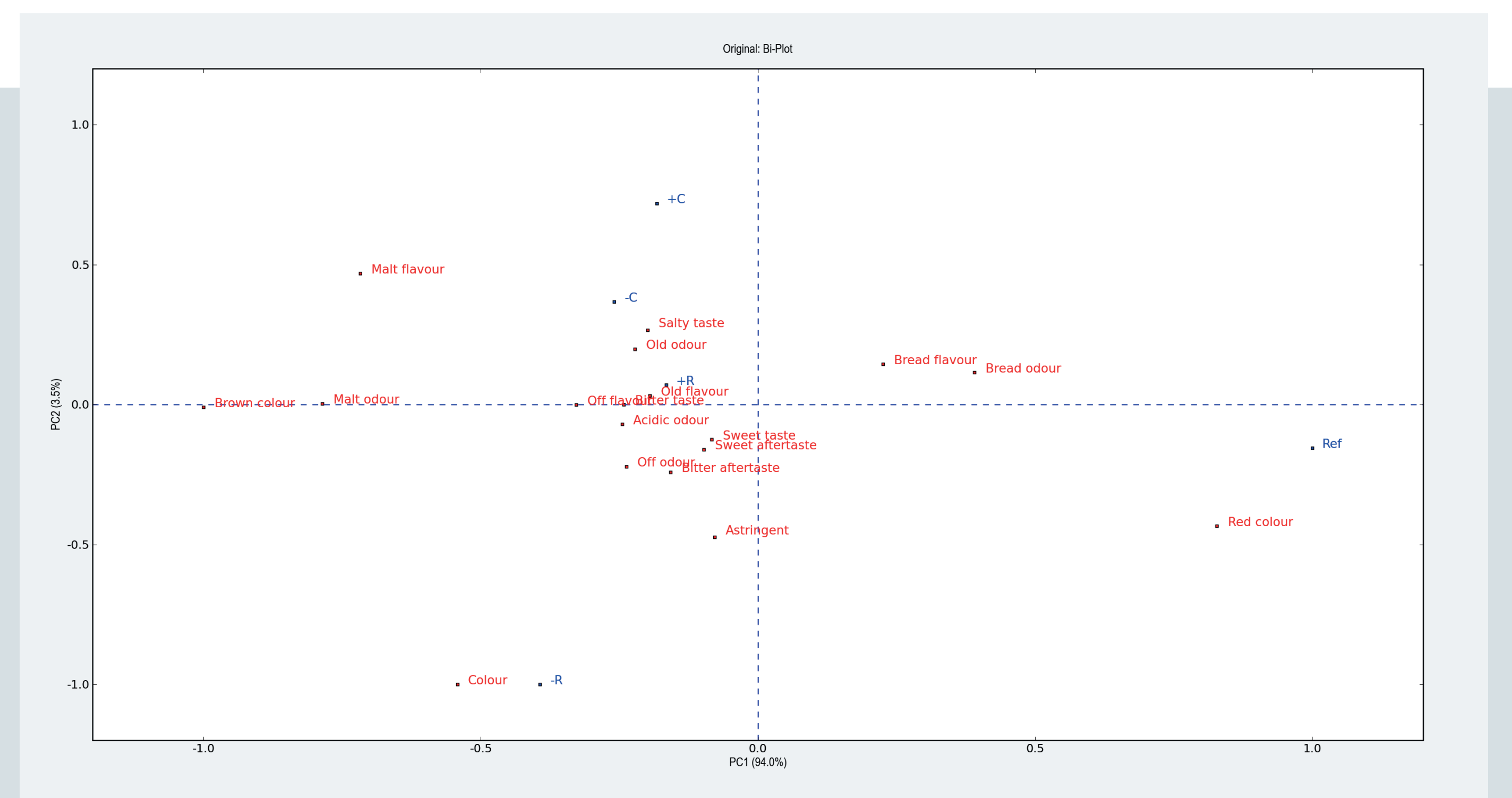


Figure 1. Biplot from PCA of sensory profiling

## RESULTS AND DISCUSSION

The sensory data was analysed with a PCA by which it was found that 94% of the variation between samples was described by PC1 and 3.5% by PC2 (Figure 1). The main part of the attributes did not vary significantly between samples.

From the biplot (Figure 1) it was found that the colour, brown colour and malted flavour and taste were the attributes primarily describing the samples with lung protein, while the reference sample was primarily described by bread smell and flavour along with red colour.

The colour of the bread samples was significantly ( $p < 0.05$ ) darker when the lung tissue was not prewashed (Figure 2). At the same time, the ultrafiltration also indicated a darker colour in the bread. The colour measurements performed on the freeze-dried powder showed a similar pattern for the L\*-value, which measures the samples brightness, having the highest intensity of L\* for the +C sample and the lowest for the -R sample.

The iron content in the samples was lower for the pre-treated sample while membrane filtration did not have an impact on the iron content (results not shown). The lower iron content is expected to be related to the removal of blood from the lung tissue during pre-treatment.

## CONTACT INFORMATION



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