RIKILT WAGENINGEN UR

Extraneous water in import poultry meat: detection with EU regulatory and additional tools

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Aim

The aim of the study was to investigate the water/protein ratios in regular and purposely modified chicken breast fillets with the current EU regulatory approach and additional tools.

Materials and Methods

1106 chicken breast fillets samples, originating from countries outside the EU in the period 2002-2008, were analyzed for control of extraneous water by water/protein analyses with classical wet chemistry procedures (Reg (EC) No 543/2008; Reg. (EC) No 1234/2007). Trend analysis was carried out. To investigate the fitness for purpose of the classical approach for detection of extraneous water in combination with retaining agents 24 additional chicken breast samples were prepared with various retaining agents (6 different water retaining agents, 2 techniques (tumbling and injection) en 2 concentration levels of added water) and analyzed for their water/protein ratios. The prepared chicken breast samples were also subjected to the classical water/protein analyses (A), the additional analyses recommended in EC Recommendation No 2005/175: fat, nitrogen, ash, hydroxyproline, calculated carbohydrate, calculated chicken content, corrected chicken content where hydroxyproline is greater than 0,08 g/100g (B) as well as to sodium analysis (C). In addition to the single marker approach, a multivariate approach was adopted (D).

Results and Discussion

Trend analysis of the 1106 chicken breast fillets samples revealed a significant increase of the water/protein ratios in imported chicken breast samples in the period 2002-2008 (Fig.1).
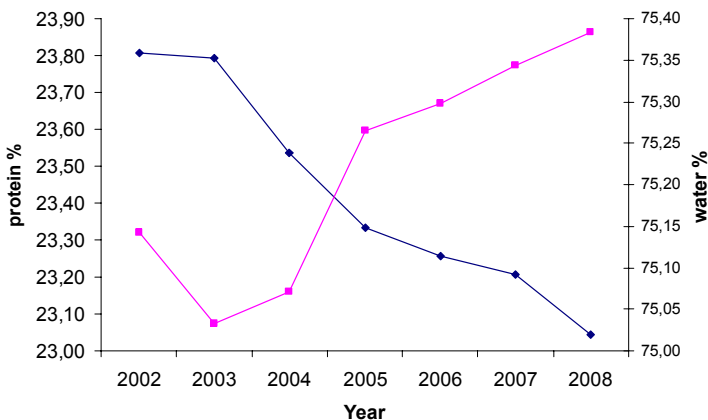

Fig. 1. Change of the water (■) and protein (■) content of chicken breast samples, originating from countries outside the EU in the period 2002-2008 (n=1106).

The results of the analysis of the 24 modified samples are presented in table 1. Analysis of the modified samples with the classical water/protein ratio approach resulted in 10 false negatives (max. ratio = 3.40) (A) and the seven additional analyses combined with the classical approach in three false negatives (B). When also the sodium content was combined (C) and a multivariate approach adopted, all modified samples were detected (D).

Table 1. Results of 24 modified chicken breast samples analyzed for extraneous water by the water/protein ratio (A), with additional analyses (B and C) and by Multi Component Analysis (PCA) (D).
(■ = False Negative), ■ = Suspected (S), ■ = Suspected but can be a salted product.

Modification	A Water/protein ratio	B Calculated chicken (%)	C Sodium (mg/100g)	D PCA
0 control 1	3,09	101,53	52	NS
Soy low tumbled	3,60	89,60	378	S
Soy high tumbled	3,51	91,21	381	S
Caseinate low tumbled	3,40	93,53	373	S
Caseinate high tumbled	3,31	95,75	358	S
Plasma low tumbled	3,50	91,58	379	S
Plasma high tumbled	3,42	93,26	452	S
Globulin low tumbled	3,42	93,09	384	S
Globulin high tumbled	3,28	96,31	378	S
Gelatine low tumbled	3,50	91,61	365	S
Gelatine high tumbled	3,47	90,38	442	S
Soy low injected	3,30	96,13	275	S
Soy high injected	3,73	85,18	1045	S
Caseinate low injected	3,51	91,16	527	S
Caseinate high injected	3,77	85,68	892	S
Plasma low injected	3,20	98,11	423	S
Plasma high injected	3,49	90,04	1206	S
Globulin low injected	3,16	98,80	416	S
Globulin high injected	3,54	89,40	1069	S
Gelatine low injected	3,15	99,14	435	S
Gelatine high injected	3,60	86,49	1287	S
Starch low injected	3,38	94,40	150	S
Starch low tumbled	3,32	95,73	119	S
Starch high injected	3,51	90,57	586	S
Starch high tumbled	3,30	96,05	248	S
0 controle 2	3,15	100,19	48	NS

Conclusions

- The present study shows a significant increase of the water/ protein ratios in imported chicken breast samples in the period 2002-2008.
- Simple water protein ratio analysis will only partially detect added water in the presence of extraneous protein.
- Additional analyses are strongly recommended for suspected samples and reduces the number of false negatives considerable.
- Multiple markers in a multivariate setting proofed a promising approach for detection of added water and water retaining agent mixtures of suspected poultry meat samples.