

Predicting protein quality of Mediterranean Buffalo meat by the determination of collagen content

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Introduction: Muscle protein quality is determined by its content of essential aminoacids, a value inversely related to connective tissue content. In fact, collagen, the major connective tissue protein, is almost completely devoided of Met, Tyr and Trp and its proportion in muscle protein may reach values up to about 24% in low-value meat cuts. Presently, there are several methods utilized to determine protein quality. However, the rat-based PER (Protein Efficiency Ratio) assay, which measures the efficiency of utilization of protein for growth as influenced by food intake, had been the most widely used procedure for determining protein quality. Since the PER test is both time consuming and costly, Lee et al. 1978 showed that the chemical determination of collagen content can be employed to provide a rapid, inexpensive and easily adaptable assay for the estimation of protein quality of meat. Therefore, the aim of this study was to predict protein quality of Mediterranean Buffalo meat by the chemical determination of collagen content.

Materials and methods: Samples of Longissimus thoracis muscle, from 6 young males and 6 spent females, were purchased in a local slaughterhouse. The nitrogen content of meat was determined by the Kjeldahl method and a nitrogen-to-protein conversion factor of 6.25 was used to calculate the protein content. Hydroxyproline (Hyp) content was determined by ISO 3496:1994 method and a factor of 7.14 was used to convert Hyp values into total collagen values. Collagen content, as a % of protein, was calculated according to the following formula: Collagen (%) = Collagen/[6.25 x (N total - N collagen) + Collagen] x 100 (Laser-Reutersward et al. 1982). The protein quality of meat samples, as estimated PER, were calculated using the following equation: $Y = -0.02290 X + 3.1528$, where Y is the estimated PER and X is the collagen expressed as % of protein (Lee et al. 1978). Data were analysed by GLM procedure considering the two market categories as main factor.

Results: The average protein content in meat from young males and spent females was 21.84% and 21.37% ($P > 0.05$), respectively. Our values were higher than that reported by Cifuni et al., 2014 and lower than those described by Failla et al. 2012 in young buffaloes.

The market category did not significantly affect Hyp and collagen content. Young males showed a slightly higher Hyp and collagen content in comparison with spent females, 0.073% vs 0.068% and 2.38% vs 2.27%, respectively. Others Authors (Kandepaan et al., 2013) found that meat from young buffaloes showed less collagen content compared with old buffaloes.

The estimated PER values calculated from the amount of collagen were 3.07 and 3.11 for young males and spent females respectively, in agreement with results obtained for buffalo meat by Babji et al. 2010 using the rat bioassay.

Conclusions: The chemical determination of collagen content can be employed to provide a rapid and low cost method for the estimation of protein quality of meat. The PER values higher than that for reference standard casein in standardized rat bioassay (2.5) confirm the high protein quality of buffalo meat.

Literature:

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