Utilization of bioelectrical impedance to predict *Longissimus thoracis et lumborum* muscle intramuscular fat in beef carcasses

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INTRODUCTION

Bioelectrical Impedance Analysis (BIA) has been used to assess body and carcass composition of several farm species. However, little information has been reported for meat quality traits such as intramuscular fat (IF), known as an element with a very important role on meat quality.

OBJECTIVES

Our objective was to examine the usefulness of BIA to predict IF content of beef *Longissimus thoracis et lumborum* muscle (LM).
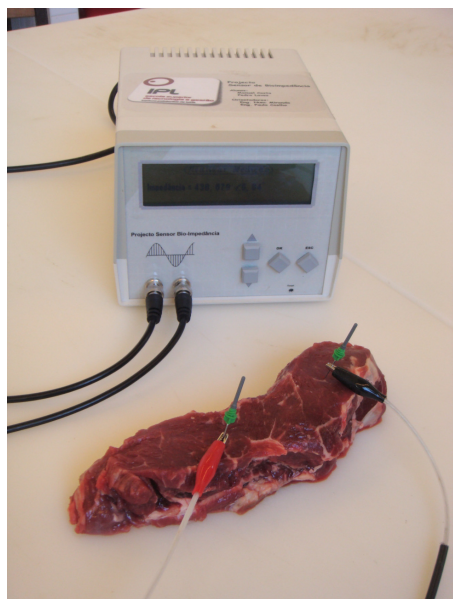

Figure 1. BIA measurements on beef LM muscle

RESULTS

The results showed that the IF content of LM was predicted accurately by Rc and Xc BIA measurements (r^2=0.73, and r^2=0.70, P<0.001, respectively).

CONCLUSIONS

From the current data set it can be concluded that BIA was able to predict IF in LM samples. Further research is needed to develop BIA equipment for use in meat processing plants for objective measurement of meat characteristics.

MATERIAL AND METHODS

➢ Fifty two samples of the LM muscle from 26 beef carcasses with 357 kg mean live weight were used.

➢ A 3 cm thick slice sample of LM was removed 24 h after slaughter at the 4th and 5th lumbar vertebrae level.

➢ After removing all subcutaneous and intermuscular fat the LM samples were placed over a flat surface for BIA measurements.

➢ A two-terminal bioelectrical impedance analyzer built specifically for this purpose, based around a high precision impedance converter AD5933 integrated circuit, was used.

➢ The response signal from the impedance was sampled by the on-board analog-to-digital converter and a discrete Fourier transform (DFT) was processed.

➢ After the calibration procedure with precision resistors and capacitors, and at the frequency point of 50 kHz, the magnitude of the impedance and relative phase of the impedance is calculated by the DFT algorithm obtaining the resistance (Rc) and reactance (Xc) values.

➢ The needles were inserted 2 cm into the LM samples with a distance of 10 cm between needles.

➢ The IF content of LM samples was determined by chemical analysis using Soxhlet method.

➢ Statistical analyses were performed using the JMP-SAS (Version 5.1). Regression analysis were established between BIA measurements (Rc and Xc) and IF.
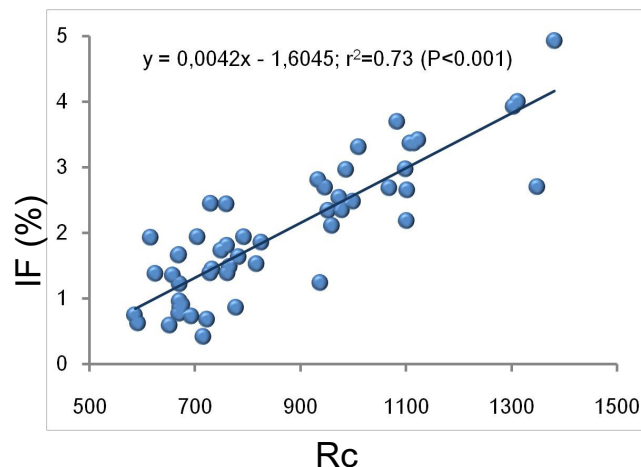

y = 0,0042x - 1,6045; r^2=0.73 (P<0.001)

Figure 2. Relationship between Rc and IF