Validation of FOSS FoodScan™ for analysis of proximate composition (moisture, protein and fat) in fresh meat (beef) products.

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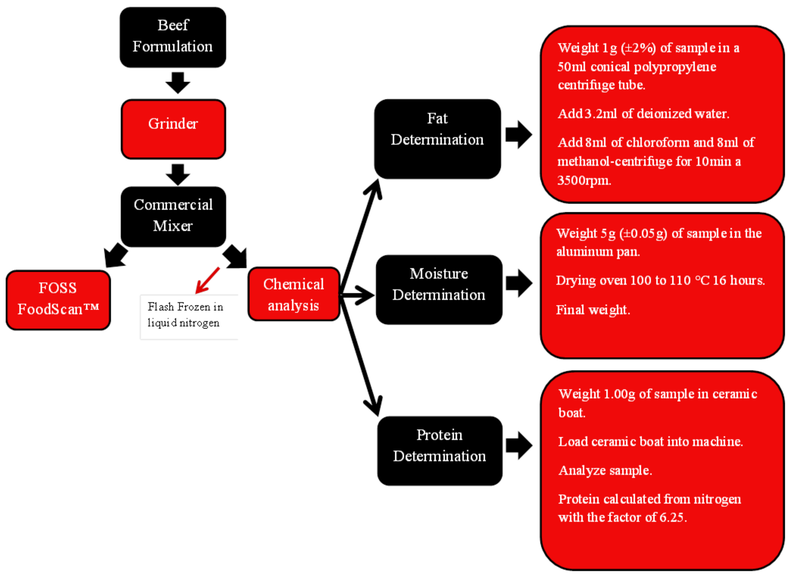
Introduction

The evaluation of fat, protein and moisture content in beef products is important in the meat industry to determine meat quality. Also, consumers are beginning to care about the composition of what they eat. In order to obtain this information, different techniques such as chemical procedures and instrumental methods have been used. Those techniques are destructive and take time to be done (Liu, Lyon Windham, Lyon, & Savage, 2004). In contrast to conventional methods, near infrared reflectance (NIR) spectroscopy is a fast, non-destructive analytical technique that needs a single sample preparation to obtain numerous meat properties (Osborne, Fearn, & Hindle, 1993). NIR equipment (FOSS FoodScan™) has the potential of predicting, quickly and accurately, this information that is obtained from the molecular bonds (chemical constitution) and tissue ultra-structure when the sample is scanned (Downey & Hildrum, 2004). Because of these advantages of the FOSS FoodScan™, this technology could be used by the industry to attain fast, accurate results.

Objectives

- To validate the FOSS FoodScan™ for proximate analysis on beef products.
- To determine differences between FOSS FoodScan™ and chemical analysis for protein, fat and moisture on beef products.

Materials and Methods



Results

Table 1. LSMeans of FOSS protein (F. Prot.), chemical protein (Ch. Prot.), FOSS moisture (F. Moist.), chemical moisture (Ch. Moist.), FOSS fat (F. Fat) and chemical fat (Ch. Fat) (n=200).

Lean:Fat	F. Prot.	Ch. Prot.	F. Moist.	Ch. Moist.	F. Fat	Ch. Fat
95:5	23.6559^{a}	21.8415^{a}	72.1137^{a}	73.6844^{a}	2.5153^{j}	5.9544^{h}
90:10	23.1798^{ab}	21.4738^{a}	68.1432^{b}	70.3367^{b}	7.7791^{i}	11.9704^{gh}
85:15	22.2339^{b}	20.5413^{ab}	64.2244^{c}	66.9407^{c}	13.7364^{h}	17.4092^{fg}
80:20	20.2242^{c}	19.0025^{bc}	60.9522^{d}	63.2197^{d}	18.9787^{g}	21.8650^{ef}
75:25	19.7474^{c}	18.4586^{c}	59.6351^{e}	62.3978^{d}	20.6881^{f}	28.4650^{de}
70:30	18.0556^{d}	16.4810^{d}	55.5157^{f}	57.1815^{e}	27.5046^{e}	31.5700^{d}
65:35	14.7215^{e}	15.5516^{d}	49.5034^{g}	52.1358^{f}	36.3366^{d}	39.9638^{c}
60:40	12.4378^{f}	12.6273^{e}	42.8063^{h}	45.4388^{g}	45.4216^{c}	51.7421^{b}
55:45	11.8485^{f}	12.0324^{e}	40.7730^{i}	42.1216^{h}	47.9214^{b}	55.6725^{ab}
50:50	9.6638^{g}	9.5708^{f}	37.1969^{j}	37.8111^{i}	52.8766^{a}	59.7425^{a}

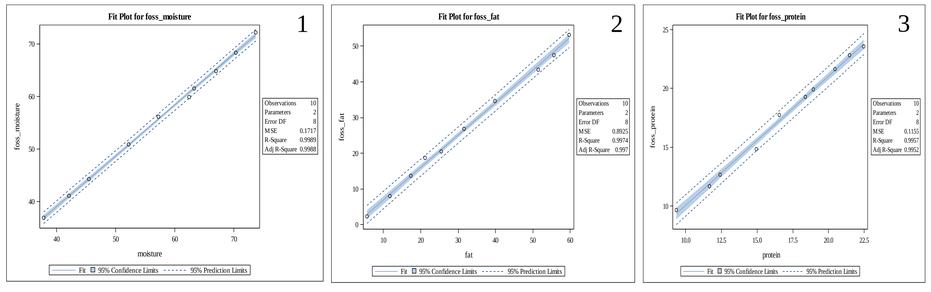
^{a,b,c,d,e,f,g,h,i,j} Within a column , LSMeans without a common superscript differ ($P<0.05$).

Table 2. Pearson correlation coefficients for each variable (n = 200).

Analysis method	Foss Fat	Chemical Fat	Foss Moisture	Chemical Moisture	Foss Protein
Chemical Fat	0.9653				
Foss Moisture	-0.9993	-0.9681			
Chemical Moisture	-0.9958	-0.9659	0.9959		
Foss Protein	-0.9858	-0.9587	0.9857	0.9848	
Chemical Protein	-0.9809	-0.9408	0.9815	0.9989	0.9744

All correlation coefficients significant ($P< 0.01$)

Figure 1. Fitplot for Foss moisture and Chemical moisture, Foss fat and Chemical fat, Foss protein and chemical protein.



1. Adjusted R-Square for Foss and chemical moisture is 0.9988.
2. Adjusted R-Square for Foss and chemical fat is 0.977.
3. Adjusted R-Square for Foss and chemical protein is 0.9952.

Conclusions

The use of FOSS FoodScan™ is a suitable, precise and faster procedure to obtain proximate composition of beef.

Using this proximal method there was not a significant difference compared with chemical methods with 95% confidence limits.

References

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