Nutrient Composition in Ground Pork Using Regression Techniques

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Introduction

• Ground pork is a combination of lean meat and fat, derived from various pork cuts. It is ground finely or coarsely depending on the amount of fat present. Previous studies indicated that total fat in ground pork products sold in retail stores ranges from 4% to 35%.

• Data on the nutrient composition of representative ground pork products currently available in the US retail market was needed to update the USDA National Nutrient Database for Standard Reference (SR).

• Scientists at USDA (Nutrient Data Laboratory), the National Pork Board and Texas Tech University collaborated to determine relationships between the content of individual nutrients and the fat content of raw ground pork using mixed model regression analysis in order to predict nutrient content based on fat content.

Objectives

• Develop regression equations for estimating the nutrient content of retail ground pork for three total fat level contents as low fat (24%), medium fat (16%) and high fat (26-30%).

• Applying the resulting equations to predict the nutrient profiles for ground pork (low, pan-browned crusts, and pan-battered) patties at three totals of fat (2%, 16% and 20%).

Methodology

• Sampling and preparation: Ground pork samples were obtained from four US commercial packers (Smithfield, Premium Standard Farms, Farmland, and Johnsonville). These samples were specially formulated by the packer to provide the following fat levels; low fat (2 – 6%), medium fat (14-18%) and high fat (26 -30%). Samples from each fat level were under conditions as raw product, pan-browned, and pan-battered. They were randomly selected within fat levels across packers; according to the sampling plan (Fig 1). Pan-browned patties: Approximately 112 g of raw ground pork was weighed and formed into patties. Patties were grilled for 15-10 minutes, on a preheated to 204°C West Bend skillet turning once. Patties were removed from the pan when the internal temperature reached 74°C and allowed to cool for 5 minutes on a rack. Pan-browned crumbles: Approximately 224 g of raw ground pork were minced and blended into patties. Patties were blended on low speed for 3 minutes. Patties were broken apart with a silicon turner while browning to form crumbles and removed from the pan when the internal temperature reached 74°C. Crumbles were drained in a colander to remove excess fat. Crumbles were allowed to cool at room temperature for 5 minutes then placed into clean unsealed vacuum bags and stored in the cooler at 4°C.

• Analytical Methods: Valid and accepted methods of the AOAC were used for nutrient analysis as indicated in Fig 2.

• Analytical Quality Control: Quality control was monitored through the use of Certified reference materials (NIST 1546, in-house control compotes (Beef/broth beef baby food and Beef/broth Chicken baby food) and random duplicate sampling.

• Statistics: Regression equations were developed for each nutrient in the raw and the cooked product relative to fat level using mixed model Regression analyses (SAS 2004). These equations were then used to estimate nutrient profiles.

Results

• The mathematical relationship between various nutrients and fat level was developed for ground pork varying in total fat content 4 – 28% fat using regression techniques. The equations developed during this study are designed to be used by the meat industry to estimate nutrient values for labeling ground pork products.

• Nutrient profiles for raw, pan – broiled crumbles and pan-battered patties for all three fat ranges were derived from these equations (Table 1 and 2).

Discussion

• The relationship between nutrients and total fat in ground pork appears to be affected by the cooking method.

• The results of this study provide a mechanism by which the nutrient content of ground pork can be estimated for any product formulated with a fat content ranging in 4% to 25%.

References

