# AMINO ACID PROFILES AND COLLAGEN CONTENT OF BOB AND SPECIAL-FED VEAL

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## SUMMARY

An analysis of amino acids and collagen was performed on four different muscles (Longissimus, Triceps brachii, Semimembranosus and Biceps femoris) from Bob and Special-fed veal. Bob veal was higher ($P<0.05$) in relative content of tyrosine, valine and leucine, and lower ($P<0.05$) in isoleucine. Within muscles, Triceps brachii was higher in alanine and leucine than the other three ($P<0.05$). Significant veal type x muscle interactions ($P<0.05$) were demonstrated for serine, threonine and histidine. Hydroxyproline and collagen were higher ($P<0.05$), and protein lower in Bob than in Special-fed veal. Bob veal contained almost twice the collagen concentration of Special-fed veal. Significant differences appear to exist between Bob and Special-fed categories for collagen, protein and several amino acids.

## Introduction

The two types of veal which are marketed in the United States are Bob and Special-fed veal. Bob veal is obtained from calves that are less than 4 weeks of age while Special-fed veal is generally procured from animals which are 12 to 16 weeks of age (Kinsman, 1989). There is very little information on the nutrient composition of meat obtained from these two types of animals. Since these two types of veal are raised on different dietary regimens and slaughtered at different ages, differences in nutrient composition would be expected. This paper describes differences observed in amino acid profile, protein and collagen content for four different muscles from Bob and Special-fed veal.

## Materials and Methods

Ten Special-fed (SFV) veal carcasses and five Bob (BV) veal carcasses were obtained from a local packer. The exact age of each animal was not known. Tissue samples were obtained from the Longissimus, Triceps brachii, Semimembranosus and Biceps femoris muscles of each carcass. Samples were frozen in sealed packages at -20°C until required for analyses.

Amino Acid Profiles: Samples of freeze-dried tissue from each muscle were hydrolyzed with 6N hydrochloric acid under vacuum at 112-116°C for 24 hr following the procedure of Bidlingmeyer et al. (1987). After hydrolysis, phenylthiocarbamyl derivatives of the amino acids were formed and separated by reverse phase liquid chromatography. The method of Cohen et al., (1989) for analysis of protein hydrolyzate was followed using the standard Pico-Tag system (Waters, Bedford, MA).

Collagen and Protein Content: Collagen and protein concentration were determined on veal muscle after mincing through a 0.4 cm plate in a table top meat grinder. Collagen content was measured in duplicate for each veal muscle sample following the procedure of Woessner (1961) as described by Sebranek et al. (1989). Protein was determined by Kjeldahl nitrogen analysis (AOAC, 1990).

Statistical Analysis: An analysis of variance was performed to separate means, and differences among means were determined by the least-square means (LSMEANS) procedure in the General Linear Models procedure of SAS (1985).

## Results and Discussion

Amino acid profiles of BV and SFV were similar (data not shown).

There was no significant interaction effect between veal type (BV vs SFV) and muscle on amino acid composition of muscles except for serine, threonine and histidine. Significant veal type x muscle interactions ($P<0.05$) were observed for serine, threonine and histidine, and these are presented in Table 1. A trend for serine and threonine in the various muscles within veal type appeared to be present. The semimembranosus and longissimus were lower in serine and threonine than biceps femoris for BV ($P<0.05$). In SFV, longissimus contained higher amounts of serine and threonine than biceps femoris($P<0.05$). The differences for hydroxyproline, collagen and protein in the BV vs SFV are presented in Table 2. The hydroxyproline (mole %) and collagen contents were higher, and protein was lower in BV than in SFV ($P<0.05$). The BV contained almost twice the collagen concentration of SFV. The ages of the BV and SFV animals used in this study were unknown. The average weights (±SD) of the BV and SFV carcasses were 22.6 (±3.7) kg and 105.6 (±9.4)kg, respectively. The protein values are in good agreement with previous reports (Wilson et al., 1954; Goll et al., 1965). The SFV values for collagen reported herein are comparable to those reported for veal by Goll et al. (1965). The BV values for collagen found in our study are substantially higher. The higher values for collagen in BV are not surprising. BV animals are younger than SFV animals when slaughtered. As such, their muscles and the constituent myofibers are smaller. This corresponds to a greater surface area per unit volume for myofibers in BV than SFV. Any constituent associated with the external area of the myofiber would be expected to be present in greater concentrations where smaller cells exist. Thus, it is logical that collagen is found in higher amounts in BV animals since it is a connective tissue component surrounding myofibers. Faustman et al. (1991) recently reported that the cell membrane lipid, cholesterol, is present in approximately 40% greater concentration in BV than SFV.

The muscle effect for hydroxyproline, collagen, and protein in veal is presented in Table 3. A significant veal type x muscle interaction was noted for collagen ($P<0.05$). Semimembranosus was generally lowest in hydroxyproline and collagen. Triceps brachii contained the highest amount of collagen in BV while no single muscle in SFV was highest.

The results of this study indicate that within veal, significant differences exist between Bob and Special-fed veal for collagen, protein and several amino acids.

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