EATING QUALITY AND PROTEIN VALUE OF BEEF AND BEEF-COTTONSEED BLENDS

by

BETH ROSE MOLONON

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Approved by:

Major Professor

This is dedicated to the man I love and will forever love, whose strength, patience, understanding, and love so inspires my life and work.

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INTRODUCTION

One important unsolved nutritional problem is that of meeting the protein requirements of man. Protein deficiencies arise either from the lack of an adequate food supply, or as a result of social, economical and cultural factors which lower the consumption of vulnerable groups of the population as a whole (WHO/FAO, 1965; Wilcke, 1969). Even in the United States, 2-7% of low income families receive less than two-thirds of the National Research Council's (NRC) recommended dietary allowance for protein (Eagles, 1969).

Presently the protein sources in developed nations are primarily from animal protein (Altschul, 1969). About one-third of food expenditures in the United States is for red meat. The per capita consumption was seventy-eight pounds of beef in 1953 and increased to 109 pounds in 1973 (USDA, 1974). More than 22% of total beef use was ground beef (Wolford, 1974). With increasing population and food cost, it may become necessary to utilize high quality, low cost plant proteins to provide adequate proteins for the population. Such plant protein may be incorporated into the diet by blending with an already familiar and acceptable animal protein source, such as ground beef (Gabby, 1966).

Soy and cottonseed provide high quality proteins and are produced in larger amounts throughout the world than

other available plant proteins. However, those plant proteins are of lower quality and are less familiar to the consumer than animal proteins. Hence, the use of soy and cottonseed protein as meat extenders is a practical approach to increase protein consumption without sacrificing nutritional value.

The U.S. Department of Agriculture forecasts use of textured soy proteins by 1980 to be 10-20% of the total beef market, or 2-4 billion pounds of hydrated soy (Bird, 1973; Wilding, 1974). At the present time, the Food and Nutrition Service of the USDA School Lunch Program allows a meat and textured vegetable protein blend (Maximum 30% hydrated vegetable protein, 70% meat) as an acceptable alternative in school lunch programs (FNS, 1971).

FDA approved the use of flour from glanded cottonseed, produced by liquid cyclone process (LCP) as a food additive (U.S. FDA, 1972) but studies on the use of textured cottonseed protein as meat extenders have not been made. The object of this study was to determine eating quality and protein value of beef-cottonseed blends (100, 85, and 70% beef).

REVIEW OF LITERATURE

This review concerns the use of vegetable proteins as meat extenders and their effect on physical and chemical characteristics, eating quality, and nutritive value of the vegetable protein-meat blends. A review of the research on soy as a meat extender is included since little has been reported on other vegetable proteins.

Physical and Chemical Characteristics of Vegetable Proteins

Cooking losses. Soy concentrates absorb about five times and soy isolates about six times their weight of water; they absorb about 1.5 times their weight of oil. Water absorption values of 2.5 times its weight and oil absorption values of 1.5 times its weight have been reported for LCP cottonseed flour (Olson, 1973). Therefore, the addition of such products to meat may reduce cooking losses. Anderson and Lind (1975) formulated 100% beef patties and patties containing 75% beef and 25% hydrated textured soy protein (TSP), hydrated at a ratio of 2 water : 1 soy, and adjusted the mixtures to approximately 15, 20, 25, and 35% fat. The cooked (to 160°F) yields of fried or broiled patties containing soy slightly exceeded those of beef patties. Regardless of the fat and moisture levels of raw patties, beef-soy patties retained more moisture and less fat after cooking than did beef patties.