

The Effect of Microwaves on Nutrient Value of Foods

by

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## TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS . . . . .	i
LIST OF TABLES AND FIGURES . . . . .	iii
Chapter	
1. INTRODUCTION . . . . .	1
A. Microwave Energy . . . . .	1
B. Microwave Heating Mechanism . . . . .	3
C. Energy and Time Savings . . . . .	5
D. Utilization and Applications of Microwave Energy . . . . .	6
2. EFFECT OF MICROWAVES ON NUTRIENT VALUE OF FOODS . . . . .	9
A. Moisture . . . . .	11
B. Protein of Animal Origin . . . . .	15
C. Protein of Non-Animal Origin . . . . .	19
D. Carbohydrate . . . . .	22
E. Lipid Oxidation and Total Fats . . . . .	22
F. Minerals . . . . .	27
G. Vitamins . . . . .	29
a. Fat Soluble . . . . .	29
b. Water Soluble . . . . .	30
3. SUMMARY AND CONCLUSIONS . . . . .	48
A. Problems with Microwave Data . . . . .	48
B. Conclusions . . . . .	49
C. Recommendations . . . . .	50
BIBLIOGRAPHY . . . . .	52

## LIST OF TABLES AND FIGURES

Table		Page
1	Effect of Cooking Method on Content of Beef Patties . . . . .	11
2	Moisture Content of Raw and Cooked Meat . . . . .	12
3	Mean Percent Protein Content of Roast Cooked by Microwave and Conventional Methods . . . . .	16
4	Proximate Composition of Microwave vs. Water Defrosted Raw, Headless Shrimp . . . . .	19
5	Mean Values of Thiobarbituric Acid (TBA) Numbers of Heated Pork . . . . .	24
6	Thiobarbituric Acid Numbers for Cakes . . . . .	25
7	Effect of Heating Treatment on Crude Fat and Cholesterol Levels in Beef Patties . . . . .	26
8	Mean Mineral Content ( $\mu\text{g/g}$ ) and Percent Retention in Roasts Cooked by Microwave and Conventional Methods . . . . .	28
9	Thiamine Content of Cooked Meat . . . . .	32
10	Effect of Heating Method on Thiamine Content of Pre-cooked Frozen Food Products . . . . .	34
11	Mean Contents ( $\mu\text{g/g}$ ) and Percent Retention of Vitamins in Roasts Cooked by Microwave and Conventional Methods . . . . .	37
12	Mean Reduced Ascorbic Acid Content of Fruits and Vegetables After Cooking by Microwave, Conventional and Convenient Methods . . . . .	43
13	Ascorbic Acid Retention in Fresh and Frozen Vegetables after Cooking in a Conventional and a Microwave Oven . . . . .	44
Figure		
1	Radiant Waves Characterized by Wavelength and Frequency of Vibration . . . . .	2

## 1. INTRODUCTION

### A. Microwave Energy

Microwaves are high frequency radiations with 1 m to 0.1 mm wavelengths in air. This type of radiation is expressed in millions of cycles/second or mega Hertz (MHz) with frequencies ranging from 300 to 30,000 MHz.

Microwave radiation represents only one part of the electromagnetic radiation spectrum. Other entities of the spectrum include gamma rays, ( $\lambda \sim 10^{-11}$  to  $10^{-16}$  m), x-rays ( $\lambda \sim 10^{-8}$  to  $10^{-11}$  m), ultraviolet ( $\lambda \sim 10^{-7}$  m), visible ( $\lambda \sim 10^{-6}$  m), and short and long radio waves ( $\lambda \sim 10^{-4}$  to  $10^{-8}$  m). X-rays and gamma rays are electromagnetic radiation arising from the shift of energy of orbital electrons and nuclear particles, respectively. They differ from the rest of the spectrum by their ability to ionize other compounds. These high energy radiations separate electrons from molecules encountered along their paths thus creating charged ions. The resultant electrically charged ions are capable of causing chemical changes in surrounding matters with little or no temperature rise. These processes occur in fluorescent lightbulbs, X-ray machines,  $\gamma$ - radiation chambers, or in matter exposed to  $\beta$  particles. Much research on the biological effects of ionizing radiation has been conducted and reported (71). A brief summary of research data on these effects is included in Chapter 3.

Ultraviolet, infrared, microwaves and radio waves have longer wavelengths than ionizing radiation and are classified as non-ionizing because they do not possess enough energy to ionize other compounds.