NUTRITIONAL KNOWLEDGE OF THE HOME ECONOMICS FACULTY AND GRADUATE STUDENTS AT KANSAS STATE UNIVERSITY

by

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INTRODUCTION

With the increasing awareness of nutrition in the American society, the general public is influenced by the nutrition recommendations of a wide variety of professional persons such as physicans, nurses, social workers, public school teachers, extension workers and home economists. Most, but not all, of these persons have had one or more nutrition courses as part of their educational training.

However, knowledge of nutrition may be limited in some of these professional groups. Physicians in Nebraska answered 65% of 55 nutritional knowledge questions correctly; they tended to score higher on basic nutritional knowledge questions than on those relating to therapeutic nutrition (Krause and Fox, 1977). Public health nurses in the province of British Columbia, Canada made mean test scores of 74.9% and 65.1%, respectively, on nutritional knowledge and practices (Schwartz, 1976). Registered nurses in Nebraska answered approximately 75% of 30 nutritional knowledge questions correctly but received low test scores because they indicated a low degree of certainty that their answers were correct (Vickstrom and Fox, 1976). Early elementary classroom teachers in Nebraska made a mean score of 58.3% out of a possible 140 on a nutritional knowledge test (Peterson and Kies, 1972). Grocery store managers who influence food purchases of consumers by their advertisements scored 68% correctness on a nutritional

knowledge test conducted in Nebraska (Stanfield and Fox, 1977). A study of food beliefs of professional and civic-minded women in Texas indicated that the participants whose education included home economics and nutrition did not accept myths about foods as readily as their peers in other disciplines, but they did accept some food fallacies as true (Wilson and Lamb, 1968). A statistical correlation was found between food misinformation and educational attainment of upper class homemakers in New York City (Schulte, 1962). However, the correlation was not large enough to be of any substantial value for future predictions.

In the past the term home economics has been defined as the profession of homemaking. Today more individuals are referring to home economics as a science focusing on the family and including many professions such as fashion marketing, early childhood education, consumer interest, nutrition, dietetics, extension home economics, home economics education and many others. Professionals in all these areas are referred to collectively as home economists even though their loyalty may be to their specialty. Regardless of the specialty, the home economist frequently is called upon to provide answers to questions related to nutrition. With the increasing awareness of nutrition in the American society, it is essential that those who are referred to as home economists be knowledgeable in this area. The purpose of this study was to assess the nutritional training and knowledge of the faculty and graduate students in the College of Home Economics at Kansas State University.

REVIEW OF LITERATURE

Various controversial aspects of nutrition, such as protein, megavitamin therapy, fluoridation, weight reduction, stress, calories and mental work, alcohol as an energy source and processing of food products have been the subjects of discussion and research by many individuals in the past few years.

Protein

Protein is a major constituent in the diet. Its functions in the body are diverse. Protein-rich food builds and replaces body tissues, contributes valuable vitamins and minerals and can serve as an energy sourse. Van Itallie (1968) claimed increased protein in the diet is beneficial in building up protein stores. The body does not store protein as it does fat. Each cell is selective in its need for specific amino acids needed for body repair. After each cell has used the appropriate kind and amount of amino acids, excess protein is taken up by the blood and carried to the liver. In the liver, excess amino acids are either redistributed or deaminized and the nonnitrogenous portion is formed into urea which is eventually excreted by the kidneys (Gutherie, 1975).

Gelatin, a pure protein, has been associated incorrectly with strengthening of fingernails. Gelatin is an incomplete protein that does not contain all the essential amino acids needed for repair, growth and maintenance of body tissues (Orr

and Watt, 1957). Fingernail formation may be affected by numerous factors such as environment, nutritional status and endocrine state. No evidence has been found that protein will improve the condition of fingernails.

Recent years have shown an increase in vegetarian diets. To many, a vegetarian is anyone who does not include meat, fish or poultry in the diet. But vegetarian diets are of a variety of types (Register and Sommenberg, 1973). Lacto-ovo vegetarian diets do not include meat or meat products, but do include eggs, milk and milk products. Lacto-vegetarian diets include milk and milk products but are void of meat, fish or poultry. The Pure vegetarian diets are lacking in all meats and meat products, fish, poultry, milk or milk products and eggs. Vegetarians may obtain adequate nutrition if their diets provide sufficient calories, a proper combination of essential amino acids and ample amounts of vitamin A, calcium, riboflavin, iron and vitamin B_{12}. Sufficient amounts of vitamins and minerals and other nutrients may be obtained by vegetarians when legumes, whole grains, nuts, seeds and a variety of vegetables are consumed. Vegetables should include the dark-green, leafy types. Only pure vegetarians who do not include any animal products must include a vitamin B_{12} supplement, as vitamin B_{12} is not present in plants. Supplements of B_{12} may be derived from vitamin pills or some plant foods that are fortified with this vitamin such as soy milk (American Academy of Pediatrics Committee on Nutrition, 1977).

Megavitamin Therapy

"Once a day, just to be sure, millions of Americans are taking vitamins, especially during the cold season" is a common advertisement heard daily on television and advertised in the mass media. "If a little is good, a lot is better," is a common misconception applied to vitamin intake. Statistics compiled by the FDA's National Clearinghouse for Poison Control Center has shown over 4000 cases of vitamin poisoning each year (Heenan, 1975). As an example, the Food and Drug Administration reported vitamin A toxicity in a four year old boy who had consumed 40 children's vitamin pills in hopes of growing faster.

Additional vitamin supplements are not needed for those persons who eat a well balanced diet. Excess vitamins ingested will produce no additional beneficial effects, but adverse reactions may occur. Vitamins in excess amounts act as chemicals and not as vitamins. Vitamin B_{12} in excess may act as a reducing agent to destroy other nutrients; large doses of nicotinic acid may cause liver damage, jaundice, elevated blood sugar levels, elevated serum uric acid and peptic ulceration (Herbert, 1977). Megadoses of folate may inactivate the medicinal effect of dilatin in individuals prone to seizures or convulsions (Ch'Ien et al., 1975).

Heenan (1975) stated that many myths about vitamins are difficult to distinguish from fact because they have been accepted by many health conscious Americans over a long period of time. For example, many Americans believe that vitamins

will provide extra pep and energy. Some B vitamins do aid in the conversion of food to usable energy, but there are no added benefits for intakes above the recommendations of the National Research Council.

Vitamin A. The late Adelle Davis was a prominent figure in the field of nutrition. She was trained in dietetics and nutrition at the University of California at Berkeley and received an M.S. in biology from the University of Southern California Medical School in 1938. Her books have sold millions of copies and have made many people aware of nutrition as an important factor in their lives. However, many aspects of her writings are oversimplified to a point that they are not completely accurate and some statements are based on her own experiences as a nutritionist. She advocated the use of massive doses of vitamin and mineral supplements which she believed were necessary for optimal health. Davis (1970) stated that she believed it was impossible for any one to get an adequate intake of vitamin A because it is destroyed by nitrates in fertilizers and food preservatives. She considered the likelihood of toxicity to be small and stated that symptoms of vitamin A toxicity disappear after a few days. Prevention or correction of these symptoms could be corrected by increased consumption of vitamin C supplements.

Carotenoids of plant origin are converted to vitamin A in the intestines. Ingestion of preformed vitamin A in the form of animal products or synthetic vitamin A supplements also contribute significant sources of this vitamin. There is no

toxicity from excessive vitamin A in the form of carotenoids, but toxicity can result from excess preformed or synthetic sources of vitamin A. Symptoms of hypervitaminosis A include intercranial pressure resulting in headaches, vomiting, lethargy, dry skin and mucous membranes, sparse hair, brittle nails and bone or abdominal pain (Joint Committee Statement of American Academy of Pediatrics Committee on Drugs and on Nutrition, 1971).

Vitamin C. Excessive doses of vitamin C are consumed in the belief that vitamin C will cure the common cold. This fallacy is largely the result of a book written by Nobel prize winner Linus Pauling, "Vitamin C and the Common Cold" (Pauling, 1970). Recommendations for large doses have been publicized largely through mass communication along with the personal testimony of Pauling to its effectiveness. According to the Committee on Drugs of the American Academy of Pediatrics, no research has substantiated any of the claims suggested by Pauling (American Academy of Pediatrics Committee on Drugs, 1971).

Pauling's book is said to lack information about possible toxicity that might result from excessive intakes of vitamin C. Conditions that may arise include acidity in the urine which may lead to renal calculi formation, or to urate stones in those with a tendency toward gout. Oxalic acid, a metabolic by-product of ascorbic acid, also may accumulate after large doses of vitamin C, and contribute to formation of oxalate calculi (American Academy of Pediatrics Committee on Drugs, 1971). A review

in the Journal of the American Medical Association by Franklin C. Bing stated that Pauling was not acting as a scientist looking for truths, but more as an advertiser trying to promote a product (Bing, 1971).

Vitamin E. Vitamin E was labeled as the antisterility factor as a result of research performed at the University of California at Berkeley in 1923. These claims came about due to misinterpretation of research done on laboratory animals (Tappel, 1973). Vitamin E was shown to be a contributing factor in the prevention of sterility in male rats and toward normal reproductive functions in female rats. Other vitamin E claims that are not substantiated by sufficient research include cure for muscular dystrophy in humans, relief of many heart ailments, increased effects for physical vigor, endurance and strength, a preventative agent against old age, a cure for cancer and a protective agent against air pollution (Institute of Food Technologists' Expert Panel on Food Safety and Nutrition and the Committee on Public Information, 1977). Because of insufficient research or results obtained from animal research not applicable to humans, claims about vitamin E have not proven to provide the stated effects.

Recommended dietary allowances (NRC-RDA) for vitamin E were first established in 1968 (Food and Nutrition Board of the National Research Council, 1968). Research at the Clinical Center of the National Institutes of Health showed that American adults were receiving less than the 1968 NRC-RDA (25-30 I.U.)

for vitamin E (Bieri and Evarts, 1973). However, the amount of polyunsaturated fats in the American diet was already high enough in fat and calories without the increase of additional vegetable oils, margarine or shortening that would increase the level of vitamin E in the diet (Bieri and Evarts, 1973). Lack of evidence from scientific studies showing the American adult public to be deficient in vitamin E, led to the lower NRC-RDA (12-15 I.U.) for adults in 1974 (Food and Nutrition Board of the National Research Council, 1974). Extra vitamin E supplements above those which are needed for normal bodily functions have not proven to produce any additional benefits for humans.

Fluoride

Fluoride is found in small amounts in various sources: soil, plants and animals. Diets contain varying amounts of fluorides (Schlesinger, 1965). There continues to be controversy over the addition of fluoride to the nation's water supply. The U.S. Public Health Service has been unable to find any evidence that the addition of 1 ppm of fluoride to drinking water causes hazardous effects (Guthrie, 1975). Evidence has been found that the incidence of tooth decay was reduced in some cases by 50-60% when fluoride was used in the water supply.

The mechanism by which fluorine functions in the body for prevention of dental caries is only theorized. It is believed that fluorine is involved in the formation of the fluorcapatite in the outer layers of the teeth. This increase of fluorine

within the tooth seems to increase its susceptibility to bacterial attack, which is one of the major causes of dental caries (Bronner, 1969).

As of 1965, the water supply for more than 54 million Americans had the optimum levels of fluoride added. Fluoride also is added to the water supplies in over 28 foreign countries (Schlesinger, 1965).

Weight Reduction

The American public is being plagued continuously by nutritional advice on the subject of weight reduction. People are susceptible to many claims about weight-reduction diets, because they are seeking information about weight loss regimens that will involve little or no suffering. "Calories Don't Count" was the catchy title of a book written by Herman Taller (1961). Taller believed obesity was due to excessive intakes of carbohydrates. His theory may be somewhat correct but it must be expanded to include the reasoning that excess food energy in relation to lower energy expenditures will result in weight gain (Krehl, 1962).

No single food has weight reduction properties. A common weight reduction misconception includes eating grapefruit before every meal in hopes of the fruit burning fat or eating only a single food item in order to lose weight. Limitation to only one food in the diet will allow a person to lose weight but nutritional quality cannot be maintained on any one food (American Dietetic Association, 1953).

Another common misconception about weight is the idea that eating food before bedtime will cause weight gain (American Dietetic Association, 1953). Weight gain is caused by excess intake of calories above body needs regardless of the time of day calories are consumed.

Stress

The human body is subject to stress caused by a variety of environmental, emotional and physiological factors. Emotional stress can affect the body's capacity to utilize nutrients. In a research study conducted by Stearns (1958) in Iowa City, pregnant women and girls placed under emotional stress showed negative balances of nitrogen and calcium. During times of stress the body secretes hormones to help the system adjust to the challenges facing it. The hormones of the adrenal medulla, the catecholamines (epinephrine and norepinephrine) act in times of stress to increase production of glucose in the liver at the expense of stored fat and muscle protein (Exton et al., 1970). In a study involving race car drivers, triglycerides, free fatty acids and two hormones, epinephrine and norepinephrine, were elevated in the drivers after the race (Taggert and Carruthers, 1971).

Calories and Mental Work

Common food and nutrition misconceptions include the claim that extra food energy is needed for mental activity. Extra food energy is not needed for mental work. Increases of 3-4%

of basal energy calories during times of mental work has been attributed to increased muscle tension of the body and not to increased brain cell activity (Guthrie, 1975).

Alcohol

Alcohol has become a controversial issue not only morally but scientifically and philosophically. Little is known about the tolerance of alcohol by individuals, but much is known about mechanisms of absorption, metabolism and utilization of alcohol. Alcohol is a high calorie food furnishing 7 calories per gram as compared to 9 calories per gram for fat or 4 calories per gram for either protein or carbohydrate.

All alcoholic beverages contribute to the caloric intake of individuals, but they are limited in their nutritive contributions to the body. Beer, as an exception, does supply some protein, as well as some vitamins and minerals (Westerfeld and Schulman, 1959). Bebb et al. (1971) studied the caloric and nutrient contribution of alcoholic beverages consumed by 155 adults in Cleveland, Ohio. Those subjects consuming two or more bottles of beer daily increased their intake of niacin, phosphorous and riboflavin by 10% or more and their consumption of protein, carbohydrate and calories by more than 25%. Beer contributed 6% of the calcium they consumed. Other alcoholic beverages were shown to contribute little nutritionally, except for calories, to those subjects who consumed less than 5% of daily calories from ethanol, or an equivalent of one alcoholic drink daily.

Processing

According to the Department of Investigation of the American Medical Association (1971), processing misinformation recently has become a problem for consumers. Needless emphasis has been placed on nutrients lost through processing. When nutrients are lost in processing they are sometimes returned to the product in an enrichment program. Other nutrients not lost in the process also may be added to the product to increase its nutritional quality. Calcium may be added to enriched cereals as an optional nutrient. The most common processing techniques used today minimize losses of nutrients in foods and are considered safe. Data indicate that foods processed today are not significantly different from those processed two or more decades ago. Vitamins or minerals lost during home preparation are about the same as those which are lost in commercial processing, regardless of the type of processing (Institute of Food Technology, Expert Panel an Food Safety and Nutrition and the Committee on Public Information, 1974). The type of processing methods used on certain foods are specifically designed for that product to keep nutrient losses as low as possible (FDA, 1971).

Distorting the Facts

Nutrition misinformation frequently is found in journals, books, magazines and newspaper columns. Misinformation about nutrition has flourished because of increased nutrition consciousness and repetition of the fallacies. Facts may be

distorted in many ways, some purposely and some by chance (Deutch, 1967). Nutrition statements are quoted and they are often not in agreement with scientific research. The results of the research studies cited are often exaggerated and the findings are frequently the conjecture of the author. The public is inclined to accept the findings of preliminary research. The credentials of well-known personalities who make false claims are rarely questioned because many hold advanced degrees (White, 1973).

The mass media is often in search of controversial opinions or ideas to attract the public. Magnification and misinterpretation for profit is anticipated when the public is anxious for insight about any new subject (Enloe, 1974). The main objective of many authors is money, regardless of the validity of their subject matter. Articles are given a touch of authenticity by including quotes or references of some well-known and respected professionals in the field of nutrition (Trulson et al., 1959). Their names are used in the forward, acknowledgements and reference sections of articles.

Many false claims may continue after research negating these facts is published. Often the results are stated in technical terms the public does not understand. Also, with the constant repetition of misinformation, people are not apt to dismiss them completely from their minds.

PROCEDURE

Respondents

All individuals who were faculty or graduate students in Home Economics at Kansas State University in the spring semester of 1978 were asked to participate in this study conducted by mail. The departments or areas involved included Clothing, Textiles and Interior Design (CTID); Dietetics, Restaurant and Institutional Management (DRIM); Family and Child Development (FCD); Family Economics (FE); Foods and Nutrition (FN); General Home Economics (Gen); Home Economics Journalism (J); Home Economics Education (Ed); and Home Economics Extension (Ext).

Instrument

A letter of introduction, which gave a brief explanation of the research project and an Informed Consent Form were sent with the measuring instrument (see appendix). The instrument consisted of two sections: General Information about the participant (including department, faculty or student status, age and educational background) and a Nutritional Knowledge Test. For the nutritional knowledge test, subjects responded to true-false statements and indicated degree of certainty about their responses. All completed forms were returned to the Department of Foods and Nutrition for analysis.

Tabulation and Statistical Analysis of Data

The nutritional knowledge test responses were assigned a

numerical value according to the correctness of responses and degree of certainty as follows:

Subject responses	Degree of certainty	Assigned numerical value
Correct	1	+8
	2	+5
	3	+3
	4	+2
	5	+1
Incorrect	1	-8
	2	-5
	3	-3
	4	-2
	5	-1

A nutritional knowledge score for each individual was calculated. Scores were analyzed by analysis of variance according to: affiliated department, faculty or graduate student, age, highest degree earned, major of highest degree, number of nutrition courses taken, enrollment in other courses which included nutrition information (biochemistry, physiology, health, biology or "other"). Fisher's least significant differences (LSD) were determined when significance was noted.

The percentage of correct and incorrect responses for each question in the test was calculated.

RESULTS AND DISCUSSION

Distribution of Respondents

Responses were obtained from 224 (103 faculty and 121 graduate students) of the 313 persons who had been asked to participate. This represented a 72% return. Because of small

numbers, certain areas were grouped for statistical analysis. The departments of CTID, DRIM, FCD, FE and FN were analyzed separately. The areas of General Home Economics and Home Economics Journalism and Radio were combined into a single category (Gen) and Home Economics Education, Home Economics Extexsion and Other were grouped into another (Ed-Ext). The individuals listed in the "Other" category were mostly high school home economics teachers enrolled in various Kansas State University home economics off-campus night courses in Topeka and Wichita. The distribution of total, faculty and graduate student respondents by each department are found in Table 1.

TABLE 1

Distribution of respondents by departments.

	Total	Faculty	Graduate Students
CTID	24	15	9
DRIM	38	22	16
FCD	42	18	24
FE	17	6	11
FN	30	14	16
Gen	14	8[a]	6
Ed-Ext	59	20[b]	39[c]
TOTAL	224	103	121

[a]Gen H Ec, 6; H Ec Journalism and Radio, 2.

[b]H Ec Ext, 14; H Ec Ed, 6.

[c]H Ec Ed, 6; Other, 33.

Scores for the Nutritional Knowledge Test

The possible minimum and maximum total scores for the fifty question test were -400 and +400 based on both correctness of response and degree of certainty. Distribution of scores are shown in Table 2. Scores for each individual by code number are found in Appendix Tables 24 and 25.

The highest nutritional knowledge test score was 388, and the lowest was -40. Approximately two-thirds (68.7) of the scores fell within the 1-200 range. There were 28.1% above 200 and 3.1% below 1.

TABLE 2

Distribution of nutritional knowledge test scores.

Test score range	Respondents No.	Respondents %
301-388	23	10.3
201-300	40	17.8
101-200	79	35.2
1-100	75	33.5
-40- 0	7	3.1

Department and Faculty or Graduate Student

Analysis of variance of nutritional knowledge scores (Tables 3,4) indicated there were significant differences among departments and between graduate students and faculty. Departmental differences were essentially the same for faculty as for graduate students. Mean nutritional knowledge scores of

faculty and graduate students combined is shown in Table 5. Mean scores of FN were significantly higher than those of any other group and the DRIM mean score was higher than those of all groups but FN. There were no significant differences among FE, Ed-Ext and Gen scores, but FE and Ed-Ext scores were significantly higher than those of FCD and CTID, which were not different from each other.

Significant differences were observed in three departments between faculty and graduate students: FE ($P<0.01$), FN ($P<0.05$) and Ed-Ext ($P<0.10$) (Table 6). In those three departments the faculty had significantly higher nutritional knowledge scores than the graduate students. The mean score of all the faculty was 162.9 and this score was significantly higher ($P<0.01$) than the mean score of 133.7 for all the graduate students.

TABLE 3

Nutritional knowledge scores by departments and faculty/graduate students.

	DF	Mean squares	F-ratio
Department	6	171288.8	32.4^{**}
Faculty/student	1	36667.8	6.9^{**}
Department faculty/student	6	5249.4	0.9^{ns}
Residual	210	5275.0	

**Indicates significance at the 0.01 level.

^{ns}Indicates non-significance.

TABLE 4

Least significant differences for nutritional knowledge scores by departments.

Departments	DRIM	FE	Ed-Ext	Gen	FCD	CTID
FN	35.0*	44.5*	32.5*	46.4*	34.2*	39.7*
DRIM	--	43.0*	30.4*	48.9*	32.2*	38.0*
FE	--	--	41.0	52.7*	42.3*	46.9*
Ed-Ext	--	--	--	43.1*	29.5*	35.8*
Gen	--	--	--	--	44.3	48.7
FCD	--	--	--	--	--	37.3

*Indicates significance at the 0.05 level.

TABLE 5

Mean nutritional knowledge scores of faculty and graduate students combined by department tested.

Department	Number	Mean score
FN	30	284.8^{a}
DRIM	38	216.8^{b}
FE	17	131.8^{c}
Ed-Ext	59	131.2^{c}
Gen	14	104.4^{cd}
FCD	42	86.4^{d}
CTID	24	82.6^{d}

^{abcd}Mean scores in a column with a common letter are not significantly different ($P<0.05$).

TABLE 6

Mean nutrition scores for faculty and graduate students by affiliated departments.

Department	Faculty		Graduate students
All	162.9	**	133.7
FN	311.2	*	258.4
DRIM	209.8		223.6
FE	168.8	**	94.9
Ed-Ext	149.0	+	113.4
Gen	108.9		99.8
FCD	100.9		72.0
CTID	91.7		73.6

**Indicates significant difference at the 0.01 level.

*Indicates significant difference at the 0.05 level.

+Indicates significant difference at the 0.10 level.

Age

All faculty and graduate students were grouped by age into one of four categories: 20-29, 30-39, 40-49, 50 and above to determine whether age affected mean nutritional knowledge scores. It had been assumed that the younger age groups had received their college education more recently than the older age groups and that nutrition information was more available to them whether or not they actually took nutrition classes. However, no statistical significance by age was found (Table 7). The mean scores are shown in Table 8.

TABLE 7

Nutrition scores according to age.

	DF	Mean square	F-ratio
Age	3	8935.2	0.891^{ns}
Residual	230	10033.4	

^{ns}Indicates non-significance.

TABLE 8

Mean nutritional knowledge scores according to age.

Age	No.	%	Mean scores
20-29 years	98	43.8	137.9
30-39	75	33.4	150.4
40-49	27	12.0	158.4
50 and above	24	10.7	171.8

Nutritional Knowledge Scores and Highest Degree Earned

Each participant was placed in a category according to their highest educational degree: B.S., M.S. and Ph.D. The analysis (Table 9,10) showed that nutritional knowledge scores were higher for individuals with an M.S. or a Ph.D. degree than for those with a B.S. degree. Highest mean score by degree (Table 11) was earned by those individuals having a M.S. degree (169.2) followed by those with a Ph.D. (165.2) degree, then those with a B.S. degree (118.8).

TABLE 9

Analysis of variance of nutritional knowledge scores by highest degree earned.

	DF	Mean square	F-ratio
Degree	2	65376.9	6.869**
Residual	221	9517.6	

**Indicates significance at the 0.01 level.

TABLE 10

Least significant difference for degree.

Degree	M.S.	Ph.D.
B.S.	28.1*	36.6*
M.S.	--	36.4

*Indicates significance at the 0.05 level.

TABLE 11

Mean nutritional knowledge scores by highest degree earned.

	Highest degree earned	No.	%	Mean score
Degree	B.S.	90	40.2	118.8
	M.S.	95	42.4	169.2
	Ph.D.	39	17.4	165.2

Nutritional Knowledge Score According to Major for Highest Degree Earned

All participants were categorized into one of ten subclasses according to major associated with their highest earned degree: Clothing, Textiles and Interior Design (CTID); Dietetics, Restaurant and Institutional Management (DRIM); Family and Child Development (FCD); Family Economics (FE); Foods and Nutrition (FN); General Home Economics (Gen); Home Economics Education (Ed); Home Economics Extension (Ext); Biological Sciences (Biol Sci) and Sociological Sciences (Soc Sci). The Biol Sci subclass included majors such as nursing, dental hygiene, agriculture, biological sciences, general science, physics and entomology. The Soc Sci subclass included the majors of business, political science, economics, sociology, liberal arts, phychology, languages, elementary education and counseling and guidance.

Statistical differences were shown to exist ($P<0.01$) between majors (Table 12,13). As expected those whose majors were FN or DRIM had higher mean scores than the other majors (Table 14). The mean scores of the biological sciences were shown to be higher than all other majors in home economics (excluding FN and DRIM) and the sociological sciences. The lowest mean scores were obtained by those individuals whose majors included CTID or the sociological sciences; those majors comprised 31.2% of the sample studied.

TABLE 12

Analysis of variance according to major for highest degree earned.

Source	DF	Mean squares	F-ratio
Major	9	120304.1	22.4**
Residual	214	5380.8	

*Indicates significance at the 0.01 level.

TABLE 13

Least significant differences according to majors.

	DRIM	FCD	FE	FN	Gen	Ed-Ext	J	Biol Sci	Soc Sci
CTID	40.4*	40.1	56.5	41.5*	47.7	37.7*	146.8	59.0*	36.6
DRIM	--	38.0*	55.0*	39.6	46.0*	35.6*	146.3	57.6*	34.3*
FCD	--	--	54.8	39.2*	45.7	35.2	146.2	57.4*	33.9
FE	--	--	--	55.8*	60.6	53.2	151.6	69.8	52.3
FN	--	--	--	--	46.9*	36.8*	146.6*	58.4*	35.6*
Gen	--	--	--	--	--	43.6	148.4	62.9*	42.6
Ed-Ext	--	--	--	--	--	--	145.6	55.8*	31.1*
J	--	--	--	--	--	--	--	152.4	145.2
Biol Sci	--	--	--	--	--	--	--	--	54.9*

*Indicates significance at the 0.05 level.

TABLE 14

Mean nutritional knowledge score according to major for highest degree earned.

Major	No.	%	Mean score
FN	25	11.2	284.4
DRIM	28	12.5	249.8
Biol Sci	8	3.6	189.9
FE	9	4.0	138.2
Ed-Ext	39	17.4	130.6
Gen	15	6.6	114.7
J	1	0.4	109.9
FCD	29	12.9	103.9
Soc Sci	47	21.0	95.6
CTID	23	10.2	82.9

Nutritional Knowledge Scores According to Number of Nutrition Courses Taken

The number of nutrition courses studied by each participant in the survey was classified into one of ten subclasses. The subclasses were as follows: no nutrition courses, one, two, three, four, five, six, seven, eight or nine or more courses. Mean Scores were calculated for each of the ten categories.

Statistical significance was shown to exist between nutritional scores and number of nutrition courses taken (Table 15, 16,17). There was no significant difference in test scores of those taking zero or one course in nutrition, but scores increased significantly as the nutrition courses taken increased

from one to two to three (Table 17). No significant differences were found among scores of those who had taken 3, 4, 5, 6, 7, 8 or 9+ nutrition courses.

TABLE 15

Analysis of variance for nutritional knowledge scores by number of nutrition courses studied.

Source	DF	Mean squares	F-ratio
Number of courses	9	77262.0	10.745**
Residual	214	7190.8	

**Indicates significance at the 0.01 level.

TABLE 16

LSD for nutrition knowledge scores and number of nutrition courses taken.

No.	1	2	3	4	5	6	7	8	9+
0	34.1	35.6*	36.9*	47.2*	52.2*	60.6*	72.2*	99.0*	86.6*
1	--	35.2*	36.4*	46.8*	51.8*	60.2*	71.8*	98.8*	86.4*
2	--	--	37.9*	47.9	52.9*	61.2*	72.6*	99.4*	87.0*
3	--	--	--	48.9	53.7	61.9	73.2	99.8	87.6
4	--	--	--	--	61.2	68.5	78.9	104.0	92.4*
5	--	--	--	--	--	72.0	82.0	106.4	95.0
6	--	--	--	--	--	--	87.6	110.8	99.8
7	--	--	--	--	--	--	--	117.5	107.2
8	--	--	--	--	--	--	--	--	126.9

*Indicates significance at the 0.05% level.

TABLE 17

Mean scores according to number of nutrition courses taken.

No. of nutrition courses taken	Respondents No.	Respondents %	Mean score
0	46	20.5	87.6^{a}
1	49	21.8	98.6^{a}
2	41	18.3	145.2^{b}
3	36	16.0	189.6^{cde}
4	17	7.6	177.2^{bcd}
5	13	5.8	236.8^{cde}
6	9	4.0	237.8^{cde}
7	6	2.6	237.0^{cde}
8	3	1.3	274.6^{cde}
9+	4	1.8	271.0^{ce}

^{abcde}Mean scores with a common letter are not significantly different ($P<0.05$).

Nutrition Knowledge Score as Affected by Various Courses From Which a Knowledge of Nutrition Was Gained

Each subject was asked to check or list various subjects taken from which a knowledge of nutrition was gained. The subjects listed were: biochemistry, physiology, health, biology and a space was provided for "other" courses not listed from which they received nutrition information. Courses that were listed under "other" courses included nursing, psychology, foods, microbiology, various non-nutrition home economics courses and dietetics courses. Mean scores were calculated for each course taken or not taken.

There was significant differences in mean test scores for those persons who had or had not taken biochemistry, physiology, and health (Tables 18,19). Nutritional knowledge scores were affected positively when individuals had taken biochemistry or physiology (Table 20). Surprisingly, test scores for those who had not taken a health course were higher than those who had.

TABLE 18

Analysis of variance of nutritional knowledge according to whether certain non-nutrition courses had been taken.

Variable	DF	Mean squares	F-ratio
Biochemistry	1	737043.6	109.2**
Residual	222	6743.8	
Physiology	1	335326.0	39.2**
Residual	222	8553.3	
Health	1	74449.0	7.6**
Residual	222	9728.4	
Biology	1	4133.9	.412^{ns}
Residual	222	10045.2	
Other	1	4836.8	.482^{ns}
Residual	222	10042.0	

**Indicates significance at the 0.01 level.

^{ns}Indicates non-significance.

TABLE 19

Least significant difference of nutritional knowledge according to whether certain non-nutrition courses had been taken.

Courses	LSD value
Biochemistry	22.4**
Physiology	22.6**
Health	22.7**
Biology	--
Other	--

**Indicates significance at the 0.01 level.

TABLE 20

Mean nutritional knowledge obtained according to whether certain non-nutrition courses had been taken.

Subclass	No. of respondents	Mean scores
Biochemistry taken	144	225.2
Not taken	80	105.2
Physiology taken	131	194.2
Not taken	93	115.6
Health taken	153	121.4
Not taken	71	160.6
Biology taken	126	153.1
Not taken	98	144.4
Other taken	172	156.6
Not taken	52	145.6

Correct and Incorrect Responses to Nutritional Knowledge Questions

Subjects were requested to respond to correctness (true-false) of the statements in the nutritional knowledge test and to indicate the degree of certainty of each answer. FN and DRIM answered 87% and 78%, respectively, of all questions correctly; Ed-Ext, FE, and Gen answered between 57% and 67% of all questions correctly. The highest percentages of incorrect responses were obtained from CTID (31%), closely followed by FCD (30%). Approximately 1/4 of the responses answered incorrectly were from the departments of Gen (29%), FE (28%) and Ed-Ext (24%). The lowest percentage of incorrect responses were obtained from FN (12%) and DRIM (18%). The highest percentage of unsure responses were obtained from Gen (12%), FCD (11%) and CTID (11%). The departments with the lowest percentage of completely unsure responses were FN (1%) and DRIM (4%) (Table 21).

TABLE 21

Percentage of correct and incorrect test scores by department.

Department	Correct (+)	Unsure (0)	Incorrect (-)
FN	87%	1%	12%
DRIM	78	4	18
Ed-Ext	67	8	24
FE	64	7	28
Gen	61	10	29
FCD	58	11	30
CTID	57	11	31

Degree of Certainty Percentages for Responses to Nutritional Knowledge Questions

Percentages of group responses according to individual point values assigned (correctness and degree of certainty) were calculated (Table 22). The calculated percentages show a large variation in degree of certainty among departments. Departments whose mean nutritional knowledge scores were highest marked the highest degree of certainty for correct answers more frequently than other departments (range 69.5% to 20.2%). This explains in part, the difference in scores among departments.

TABLE 22

Percentages of group responses according to point values assigned.

Group	Correct response					Incorrect response				
	+8	+5	+3	+2	+1	-8	-5	-3	-2	-1
FN	69.5	10.4	4.8	1.6	1.0	4.2	4.3	2.0	1.1	0.6
DRIM	51.4	16.5	6.9	2.0	1.0	4.9	6.8	3.4	1.4	1.2
Ed-Ext	36.7	15.5	8.6	2.5	3.8	7.2	7.3	5.5	1.5	3.4
FE	32.1	12.6	10.7	5.4	3.6	6.2	8.9	6.2	3.4	3.2
Gen	30.8	15.8	8.5	3.0	3.3	10.2	7.2	6.6	2.4	2.9
FCD	26.6	13.4	10.2	4.4	3.5	8.6	7.9	7.0	4.2	2.6
CTID	20.2	13.2	12.5	5.9	5.8	5.0	8.2	7.8	4.4	5.8

Discussion of Individual Questions

Comparisons of correct responses by all participants were made for each question on the nutritional knowledge test. The

questions were categorized into the following subject areas for discussion: calories, protein, carbohydrate, fat, vitamins, minerals and general nutrition information (see Appendix Table 25 for subject distribution of questions). Percentages of total responses of all subjects by individual questions are found in Appendix Table 26.

Calories

More than half of all subjects (52.2%) believed that energy expended for basal metabolism included physical activities. A majority of respondents did not realize that the caloric value of protein is equal to that of carbohydrate (57.6% incorrect). Approximately two-thirds (66.5%) realized that to lose a pound of body weight in a week, you would have to decrease your caloric intake by 500 calories per day. Most (95.0%) participants knew that potatoes and bread need not be eliminated from the diet when one is trying to lose weight. More than one-half indicated that the calories from alcohol contained more calories than sugar (57.6%). Less than one-fourth (13.4%) of all those responding incorrectly believed that toasting a slice of bread will reduce its caloric value. Approximately one-fourth (24.6%) of all respondents wrongly believed that weight gain during pregnancy should not exceed 10-15 pounds. More than one-half (54.0%) knew that 400 grams of extra fat in the diet would cause a person to gain approximately one pound of body weight, and 54.4% incorrectly thought that food eaten before bed time is more likely to cause weight gain than if the same food were eaten for breakfast.

Protein

More than a fourth (25.4%) of all subjects incorrectly believed that excess protein can be stored in the body and used for growth and maintenance of body tissues. More than a third (36.6%) of all subjects were under the impression that gelatin capsules will strengthen fingernails when in fact they do not. Approximately 90% responded correctly and believed that good health could be attained even if meat were not included in the diet. The majority agreed that peanut butter could be used as a meat substitute (84.4%). Less than one-fifth (17.4%) of all subjects incorrectly believed that the quality of protein in fruits and vegetables is better than that of animal sources. More than three-fourths (76.8%) of the subjects knew that not all amino acids can be synthesized within the body. More than one-half (54.9%) of the respondents incorrectly believed that the digestion of carbohydrates, proteins and fats begins in the mouth by the action of salivary amylase. When questioned about the amount of protein recommended by the National Research Council for most healthy persons in the United States, 29.4% answered correctly, while 45.0% answered incorrectly and over one-fourth (25.4%) were completely uncertain. Many (81.2%) answered correctly to the fact that supplementary protein contributes amino acids to other proteins in the diet that may be lacking certain amino acids.

Carbohydrate

Over one-half (57.6%) of all subjects were under the impression that the caloric value of protein and carbohydrate were different, and approximately the same percentage (57.6%) knew that gram for gram alcohol contains more calories than sugar. Almost all subjects (95.5%) knew that bodily need and desire for sweets were unrelated. Only 39.2% of faculty and graduate students were aware that salivary amylase acts only on carbohydrates and that this enzyme does not initiate digestion of protein or fat in the mouth.

Fat

Only 39.2% of the total sample of respondents knew that all vegetable oils were not high in polyunsaturated fats. With the increasing awareness of the possible relationship of cholesterol and heart disease, 91.5% of all faculty and graduate students knew that cholesterol is a normal body constituent, but only 58.6% were aware that organ meats were high in cholesterol. Approximately three-fourths of all subjects knew that diet margarine contained less fat and more water than regular margarines. With the popularity of various fad diets, the grapefruit diet being one, only one-fourth (24.1%) incorrectly believed that grapefruit can assist in burning fat in the body. To the questions regarding polyunsaturated fatty acids and the need for vitamin E in the diet, there was almost equal distrbution of incorrect and correct responses, (41.5% and 37.9%,

respectively). Just over half (53.1%) of all responses to questions about the meaning of the P/S ratio in the diet were correct.

Vitamins

Only 11.6% of the responses were incorrect in regard to synthesis of vitamin C by exposure to sunlight. Almost all people (93.8%) realized that stress can affect the body's capacity to utilize nutrients. Only a very small percentage (0.4%) of people answered incorrectly when questioned about the effects of consumption of large amounts of all vitamins and minerals and only 1.3% were completely uncertain. Although broccoli, cabbage and tomatoes are not the most frequently thought of vegetables contributing a good source of vitamin C, 69.2% realized that they did. Approximately one-fifth or 24.6% did not know that riboflavin was obtained by drinking milk. The question that had the highest percentage of correct responses was about the harmful effects of consuming large amounts of vitamins (99.1%). Nearly two-thirds of the answers were correct in regard to whether pasteurization destroyed many of the vitamins in milk. Responses were equally distributed between right and wrong with regard to the loss of nutrients in processing and if all lost nutrients were added back to the product during the enrichment process (51.3% and 45.0%, respectively). A large percentage (83.1%) indicated by their correct responses that vitamins and minerals do not provide energy. The question that had almost equal percentages of

responses of correct, incorrect and unsure concerned which vitamin would be most apt to be deficient in a vegetarian diet (respectively the percentages were 42.4%, 36.6% and 30.0%). Over one-half of the faculty and graduate students knew that toxic levels of vitamin A could not be obtained from plant sources.

Minerals

Almost all (92.4%) of the participants knew that women aged 18-50 years did not need less iron than children 0-10 years. A fourth of the group did not realize that chlorine was not the mineral that lowered the incidence of tooth decay (25.8% incorrect). Over one-half (55.4%) of all respondents incorrectly believed that sodium should be restricted in reducing diets and approximately the same proportion (50.8%) incorrectly thought that calcium needs were different for a man 50 years old and one who was 25 years of age. Correct responses (81.7%) were very high to the question whether calcium absorption is facilitated by the presence of vitamin D.

General Concepts

A large number (87.9%) of subjects recognized that milk was not a perfect food containing all essential nutrients that would maintain health. Almost three-fourths (74.1%) of the group knew that sour fruits did not cause acidosis, but 16.4% were unsure of what caused the condition. Equal numbers of correct and incorrect responses were given as to whether the

basic four food groups could serve as a basis for nutrition education throughout the world (50.4% and 46.4%, respectively).

General Discussion and Recommendations

In certain curriculums, such as Home Economics, compulsory course work is necessary to insure a basic understanding of an easily misunderstood subject. Home economists as public-viewed "experts" in nutrition, regardless of their specialty, must not perpetrate false facts simply because they do not have enough nutrition knowledge. It is, therefore, necessary for home economists in all areas to select courses which will guarantee a broader base of information than their own curriculum can provide. In view of the results of this survey, nutrition courses should be required for all home economics majors. These courses hopefully will motivate the student to take additional nutrition courses and the students particular curriculum should allow elective hours which can be channeled into this area. Nutrition seminars and non-credit nutrition courses should be provided to allow another avenue for gaining nutrition knowledge, to create enthusiasm for nutrition and to inspire self study.

SUMMARY

The nutritional knowledge of 103 faculty and 121 graduate students in Home Economics at Kansas State University was studied. The mail survey questionnaire consisted of a letter of introduction, a general information sheet about the participant, a nutritional knowledge test and an informed consent form. The maximum and minimum scores for the 50 question test were 400 and -400, respectively, based on both correctness and degree of certainty of responses. The departments or groups studied were Clothing, Textiles and Interior Design (CTID); Dietetics, Restaurant and Institutional Management (DRIM); Family and Child Development (FCD); Family Economics (FE); Foods and Nutrition (FN); General Home Economics (Gen); and Home Economics Education and Extension (Ed-Ext).

Approximately two-thirds (68.7%) of the scores fell within the 1-200 range; there were 28.1% above 200 and 3.1% below 1. Significant differences were found among departments and between students and faculty. However departmental differences were essentially the same for faculty as for students. Significant differences in departmental scores were as follows: FN > DRIM > FE, Ed-Ext, Gen > FCD and CTID (except that Gen $\simeq$ FCD and CTID). Although mean scores increased with age (by decades), the differences were not significant. Persons with an M.S. or Ph.D. degree, regardless of department and age,

scored higher than those with a B.S. degree. Respondents with majors for their highest earned degree in FN, DRIM or biological sciences made higher scores than those with majors in other areas of home economics or in the sociological sciences. Nutritional knowledge scores were related to number of nutrition classes taken in that persons with two courses scored higher than those with none or one course and those with three or more courses scored higher than those with 0-2 courses. Participants who had taken a course in biochemistry or physiology scored higher than those who had not taken them. Percentages of correct responses ranged from 87% (FN) to 57% (CTID). Degrees of certainty for responses to questions varied among departments. A question concerning the harmful effects of large doses of vitamins received the highest percentage of correct responses (99.1%), and the question concerning the knowledge of equivalent weights of carbohydrate to protein received the highest percentage of incorrect responses (57.6%). The greatest number of unsure responses was in regard to the meaning of the P/S ratio in the diet (30.8%).

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APPENDIX

February, 1978

Dear Home Econimics Faculty Member or Graduate Student:

In the past the term home economics has been chauvinistically defined as the profession of homemaking. Today more individuals are referring to home economics as a science focusing on the family and including many professions such as fashion marketing, early childhood education, consumer interest, nutrition, dietetics, extension home economics, high school home economics and many others. Professionals in all these areas are collectively referred to as home economists, even though their first loyalty may be to their specialty. Regardless of the specialty, the home economist is frequently called upon to provide answers to questions related to nutrition. With the increasing awareness of nutrition in the American society, it is essential that those who are referred to as home economists be knowledgeable in this area.

A survey of Kansas State University Home Economics faculty and graduate students is being conducted to assess their nutritional training and knowledge. We request that you participate in this study. Answering the questionnaire will take approximately 15-20 minutes.

Please return the completed forms within one week to the Department of Foods and Nutrition. Thank you for your cooperation.

Sincerely,

Jean Munchbach
M.S. Candidate

Approved:

Beth Fryer
Major Professor

Ruth Hoeflin
Dean of Home Economics

INFORMED CONSENT

This survey is being conducted under Guidelines for Research Involving Human Subjects established by Kansas State University. By cooperating, you will help provide answers to important questions; however, your participation is strictly voluntary. You may omit any question which you believe unduly invades your privacy.

The questionnaire will be coded but confidentiality is guaranteed; your name will not be associated with your answers in any public or private report of the results.

I have read the above statements and the letter explaining the nature and purpose of the research. I fully understand the procedures to be used and hereby volunteer to complete the questionnaire.

Date_____ Signed_____

GENERAL INFORMATION

Check or complete the following:

DEPARTMENT

____ CLOTHING, TEXTILES AND INTERIOR DESIGN
____ DIETETICS, RESTAURANT AND INSTITUTIONAL MANAGEMENT
____ FAMILY AND CHILD DEVELOPMENT
____ FAMILY ECONOMICS
____ FOODS AND NUTRITION
____ GENERAL HOME ECONOMICS AND DEAN'S OFFICE
____ HOME ECONOMICS EDUCATION
____ HOME ECONOMICS JOURNALISM
____ HOME ECONOMICS EXTENSION
____ OTHER _____

UNIVERSITY POSITION

____ FACULTY
____ GRADUATE ASSISTANT
____ GRADUATE STUDENT

AGE

____ 20-29
____ 30-39
____ 40-49
____ 50-59
____ 60 and over

EDUCATIONAL BACKGROUND

DEGREES: MAJOR:

____ BACHELOR'S _____
____ MASTER'S _____
____ DOCTOR'S _____

NO. OF COURSES TAKEN IN NUTRITION

____ BACHELOR'S PROGRAM
____ MASTER'S PROGRAM
____ DOCTOR'S PROGRAM

CHECK OR LIST OTHER COLLEGE COURSES FROM WHICH YOU GAINED A KNOWLEDGE OF NUTRITION

____ BIOCHEMISTRY
____ PHYSIOLOGY
____ HEALTH
____ BIOLOGY

OTHER _____
_____
_____
_____

CHECK OR LIST OTHER MAJOR SOURCES OF NUTRITION INFORMATION FOR YOU

____ BOOKS
____ SCIENTIFIC JOURNALS
____ POPULAR MAGAZINES

ORGANIZATION (SPECIFY)
_____
_____
_____

OTHER SOURCES:

NUTRITIONAL KNOWLEDGE TEST

Directions: Please answer questions without the help of textbooks or other persons.

Some statements concerning nutrition are given below. Please indicate whether or not you think a statement is true or false. Circle "T" for true and "F" for false.

After you have reached this decision indicate the degree of certainty you have about the answer.

Circle:
1. if you are very confident you have decided correctly.
2. if you are almost certain you have decided correctly.
3. if you are half certain you have decided correctly.
4. if you are not very sure you have decided correctly.
5. if you are not sure of your answer but have a guess or hunch.

If you are completely unsure of the answer, circle both "T" and "F" but do not circle a degree of certainty.

Please be sure to respond twice to every statement.

		True or False	Degree of Certainty
1.	Excess protein will be stored in the body until needed for growth and maintenance of tissues.	T F	1 2 3 4 5
2.	Milk is a perfect food since it provides all the essential nutrients in the proper amounts that will maintain health.	T F	1 2 3 4 5
3.	Vitamin C is referred to as the "sunshine" vitamin since exposure of the skin to the sun will result in synthesis of vitamin C.	T F	1 2 3 4 5
4.	Corn oil, soybean oil and coconut oil are high in polyunsaturated fats.	T F	1 2 3 4 5
5.	Cholesterol is a normal body constituent.	T F	1 2 3 4 5

		True or False	Degree of Certainty
6.	Emotional stress can affect the body's capacity to utilize nutrients.	T F	1 2 3 4 5
7.	Liver is high in cholesterol.	T F	1 2 3 4 5
8.	Basal metabolism represents the energy needed for involuntary body functions and physical activities.	T F	1 2 3 4 5
9.	It is beneficial to consume large amounts of all vitamins and minerals since the body can store these nutrients until needed.	T F	1 2 3 4 5
10.	An equivalent weight of carbohydrate has the same caloric value as protein.	T F	1 2 3 4 5
11.	Diet margarine contains less fat and more water than regular margarines.	T F	1 2 3 4 5
12.	Women aged 18-50 years need less iron than children age 0-10 years.	T F	1 2 3 4 5
13.	Sour fruits cause acidosis.	T F	1 2 3 4 5
14.	If you want to lose a pound of body weight in a week, you would have to decrease your caloric intake by 500 per day.	T F	1 2 3 4 5
15.	Broccoli, cabbage and tomatoes are good vitamin C sources.	T F	1 2 3 4 5
16.	Milk is a good source of riboflavin.	T F	1 2 3 4 5
17.	Gelatin capsules dissolved in orange juice will strengthen fingernails.	T F	1 2 3 4 5
18.	Grapefruit can assist in burning fat in the body.	T F	1 2 3 4 5
19.	Vitamin E supplements enhance sexual potency in human beings.	T F	1 2 3 4 5
20.	High intakes of certain vitamins may be harmful.	T F	1 2 3 4 5

		True or False	Degree of Certainty
21.	Potatoes and bread should be eliminated from the diet of someone trying to lose weight.	T F	1 2 3 4 5
22.	People who do not eat meat are likely to be in poor health.	T F	1 2 3 4 5
23.	Reconstituted nonfat dry milk has the same nutritive value as fresh skim milk.	T F	1 2 3 4 5
24.	Gram for gram, alcohol contains more calories than sugar.	T F	1 2 3 4 5
25.	Peanut butter is a good meat substitute.	T F	1 2 3 4 5
26.	Toasted bread had fewer calories than untoasted bread.	T F	1 2 3 4 5
27.	Pasteurization destroys many of the vitamins in milk.	T F	1 2 3 4 5
28.	A desire for candy and sweets is a sign that your body needs more sugar.	T F	1 2 3 4 5
29.	Frozen orange juice has less ascorbic acid than fresh orange juice.	T F	1 2 3 4 5
30.	All nutrients removed in the milling of white flour are added back to produce "enriched" flour.	T F	1 2 3 4 5
31.	Vitamins and minerals do not furnish energy to the body.	T F	1 2 3 4 5
32.	The protein of meat is of better quality than that of fruits and vegetables.	T F	1 2 3 4 5
33.	Severe mental work greatly increases the caloric needs of the body.	T F	1 2 3 4 5
34.	The National Research Council states that the recommended dietary allowances represent the minimal quantities of certain nutrients needed in the U.S. population.	T F	1 2 3 4 5

		True or False	Degree of Certainty
35.	Weight gain during pregnancy should not exceed 10-15 pounds.	T F	1 2 3 4 5
36.	If your diet is high in polyunsaturates you may need additional vitamin E.	T F	1 2 3 4 5
37.	A strict vegetarian diet may lack vitamin B_6.	T F	1 2 3 4 5
38.	All amino acids can be synthesized within the body.	T F	1 2 3 4 5
39.	Four hundred grams of extra fat in the diet would cause a person to gain approximately one pound of body weight.	T F	1 2 3 4 5
40.	Toxic levels of vitamin A may be obtained from plant sources.	T F	1 2 3 4 5
41.	The Basic Four Food Groups as used in the United States could serve as the basis for nutrition education throughout the world.	T F	1 2 3 4 5
42.	A water supply containing 1 ppm of chlorine is associated with a 50-60% lower incidence of tooth decay.	T F	1 2 3 4 5
43.	Digestive processes of carbohydrates, proteins and fats begin in the mouth by the action of salivary amylase.	T F	1 2 3 4 5
44.	The National Research Council recommends an intake of 1.0 gram of protein per kilogram of body weight for most healthy persons in the United States.	T F	1 2 3 4 5
45.	Most people on a reducing diet should restrict their sodium intake.	T F	1 2 3 4 5
46.	Calcium needs of a 50-year-old man are the same as those of a 25-year-old man.	T F	1 2 3 4 5
47.	Calcium absorption is facilitated in the presence of vitamin D.	T F	1 2 3 4 5

		True or False	Degree of Certainty
48.	Food eaten before you go to bed is more likely to cause weight gain than if the same food were eaten for breakfast.	T F	1 2 3 4 5
49.	P/S ratio refers to the ratio of protein to sugar in the diet.	T F	1 2 3 4 5
50.	A protein has supplementary value when it contributes amino acids that are lacking or limited in other proteins in the diet.	T F	1 2 3 4 5

CORRECT RESPONSES TO THE NUTRITIONAL KNOWLEDGE TEST

1. False
2. False
3. False
4. False
5. True
6. True
7. True
8. False
9. False
10. True
11. True
12. False
13. False
14. True
15. True
16. True
17. False
18. False
19. False
20. True
21. False
22. False
23. True
24. True
25. True
26. False
27. False
28. False
29. False
30. False
31. True
32. True
33. False
34. False
35. False
36. True
37. False
38. False
39. True
40. False
41. False
42. False
43. False
44. False
45. False
46. True
47. True
48. False
49. False
50. True

TABLE 23

Nutritional knowledge test scores of each faculty respondent.

Respondents							
No.	Score	No.	Score	No.	Score	No.	Score
1	61	27	93	53	305	79	272
2	144	28	177	54	352	80	95
3	122	29	120	55	293	81	175
4	0	30	61	56	264	82	217
5	133	31	141	57	384	83	230
6	24	32	119	58	360	84	285
7	128	33	179	59	259	85	129
8	183	34	175	60	330	86	187
9	312	35	67	61	356	87	119
10	159	36	106	62	345	88	132
11	153	37	27	63	242	89	19
12	202	38	25	64	212	90	162
13	119	39	175	65	274	91	126
14	172	40	42	66	300	92	38
15	68	41	-39	67	191	93	13
16	121	42	78	68	245	94	346
17	31	43	114	69	214	95	170
18	202	44	194	70	309	96	263
19	58	45	138	71	248	97	172
20	50	46	95	72	79	98	185
21	4	47	129	73	317	99	130
22	44	48	134	74	160	100	153
23	71	49	174	75	284	101	176
24	105	50	247	76	68	102	54
25	49	51	334	77	388	103	66
26	131	52	332	78	139		

TABLE 24

Nutritional knowledge test scores of each graduate student respondent

Respondents							
No.	Score	No.	Score	No.	Score	No.	Score
1	-40	32	256	62	76	92	197
2	284	33	316	63	133	93	2
3	29	34	205	64	8	94	55
4	91	35	245	65	3	95	23
5	107	36	337	66	83	96	205
6	77	37	314	67	89	97	111
7	112	38	254	68	3	98	216
8	56	39	224	69	37	99	174
9	31	40	317	70	67	100	198
10	0	41	293	71	162	101	69
11	9	42	184	72	0	102	132
12	115	43	287	73	222	103	60
13	57	44	340	74	194	104	59
14	73	45	146	75	247	105	42
15	25	46	76	76	221	106	78
16	223	47	179	77	328	107	295
17	64	48	20	78	300	108	134
18	253	49	339	79	117	109	177
19	37	50	60	80	207	110	37
20	81	51	100	81	278	111	48
21	94	52	344	82	3	112	199
22	- 4	53	244	83	110	113	73
23	39	54	134	84	33	114	85
24	140	55	290	85	60	115	40
25	- 9	56	166	86	188	116	193
26	104	57	22	87	95	117	134
27	77	58	28	88	123	118	133
28	91	59	88	89	146	119	106
29	105	60	110	90	145	120	52
30	191	61	110	91	134	121	179
31	317						

TABLE 25

Nutritional knowledge test questions categorized into subject areas.

Calories	Protein	Carbohydrate	Fat	Vitamins	Minerals	General Information
8	1	10	4	3	9	2
10	10	21	5	6	12	6
14	17	24	7	9	31	13
21	22	26	11	15	42	16
24	23	28	18	16	45	33
26	25	43	36	20	46	41
35	32		39	23	47	43
39	38		43	27		
48	43		49	29		
	44			30		
	50			31		
				34		
				36		
				37		
				40		

TABLE 26

Percentage of correct, incorrect and unsure responses by individual question.

Question No.	Correct	Incorrect	"0" Responses[1]	Question No.	Correct	Incorrect	"0" Responses[1]
1	71.8	25.4	2.6	26	83.9	13.4	2.6
2	87.9	11.6	0.4	27	61.6	33.9	4.4
3	86.6	11.6	1.8	28	95.5	3.1	1.3
4	39.2	57.1	3.6	29	67.0	21.8	11.2
5	91.5	6.7	1.8	30	51.3	45.0	3.6
6	93.8	5.4	0.8	31	83.0	15.2	1.8
7	53.6	38.4	8.0	32	77.6	17.4	4.9
8	42.4	52.2	5.4	33	69.6	26.8	3.6
9	98.2	0.4	1.3	34	40.6	52.2	7.1
10	37.5	57.6	4.9	35	71.4	24.6	4.0
11	76.3	15.2	8.4	36	37.9	41.5	20.5
12	92.4	4.4	3.1	37	42.4	36.6	30.0
13	74.1	9.4	16.5	38	76.8	15.2	8.0
14	66.5	23.6	9.8	39	54.0	19.2	26.8
15	69.2	29.0	1.8	40	51.3	33.9	14.7
16	67.4	24.6	8.0	41	50.4	46.4	3.1
17	58.0	36.6	5.4	42	67.8	25.8	16.0
18	69.6	24.1	6.2	43	39.2	54.9	5.8
19	82.6	11.2	6.2	44	29.4	45.0	25.4
20	99.1	0.0	0.9	45	36.6	55.4	8.0
21	95.0	4.4	0.4	46	43.8	50.8	5.4
22	89.7	10.2	0.0	47	81.7	6.7	11.6
23	85.7	11.6	2.6	48	42.4	54.4	3.1
24	57.6	30.4	12.0	49	53.1	16.0	30.8
25	84.4	12.9	2.6	50	81.2	7.1	11.6

[1]A numerical value of "0" was assigned to questions in situations where respondents indicated complete uncertainty.

NUTRITIONAL KNOWLEDGE OF THE HOME ECONOMICS FACULTY AND GRADUATE STUDENTS AT KANSAS STATE UNIVERSITY

by

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B.S., State University College Oneonta, New York, 1974

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Foods and Nutrition

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1978

The nutritional knowledge of 103 faculty and 121 graduate students in Home Economics at Kansas State University was studied. The mail survey questionnaire consisted of a letter of introduction, a general information sheet about the participant, a nutritional knowledge test and an informed consent form. The maximum and minimum scores for the 50 question test were 400 and -400, respectively, based on both correctness and degree of certainty of responses. The departments or groups studied were Clothing, Textiles and Interior Design (CTID); Dietetics, Restaurant and Institutional Management (DRIM); Family and Child Development (FCD); Family Economics (FE); Foods and Nutrition (FN); General Home Economics (Gen); and Home Economics Education and Extension (Ed-Ext).

Approximately two-thirds (68.7%) of the scores fell within the 1-200 range; there were 28.1% above 200 and 3.1% below 1. Significant differences were found among departments and between students and faculty. However departmental differences were essentially the same for faculty as for students. Significant differences in departmental scores were as follows: FN > DRIM > FE, Ed-Ext, Gen > FCD and CTID (except that Gen $\simeq$ FCD and CTID). Although mean scores increased with age (by decades), the differences were not significant. Persons with an M.S. or Ph.D. degree, regardless of department and age, scored higher than those with a B.S. degree. Respondents with majors for their highest earned degree in FN, DRIM or biological sciences made higher scores than those with majors in

other areas of home economics or in the sociological sciences. Nutritional knowledge scores were related to number of nutrition classes taken in that persons with two courses scored higher than those with none or one course and those with three or more courses scored higher than those with 0-2 courses. Participants who had taken a course in biochemistry or physiology scored higher than those who had not taken them. Percentages of correct responses ranged from 87% (FN) to 57% (CTID). Degrees of certainty for responses to questions varied among departments. A question concerning the harmful effects of large doses of vitamins received the highest percentage of correct responses (99.1%), and the question concerning the knowledge of equivalent weights of carbohydrate to protein received the highest percentage of incorrect responses (57.6%). The greatest number of unsure responses was in regard to the meaning of the P/S ratio in the diet (30.8%).