

DEVELOPMENT AND IMPLEMENTATION OF A NUTRITION
EDUCATION PROGRAM FOR INCREASED CALCIUM
CONSUMPTION IN CHILDREN

A THESIS
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COLLEGE OF NUTRITION, TEXTILES,
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BY

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CHAPTER I

INTRODUCTION

Contrary to popular belief, children and milk are no longer synonymous. Nationwide consumption of milk has been on the decline for several years. A 1969 report by the U.S. Economic Research Bureau (4) reveals that consumption of milk and milk products by individuals declined by approximately 8 percent from the preceding decade. Recent studies confirm that many children are not drinking the recommended amounts of milk. Establishment of good food habits and the acceptance of a wide variety of calcium-containing foods during the developmental period will reap lifetime benefits. Nutrition education may therefore be of greatest importance during the childhood years because young children are receptive and open to learning stimuli.

Purpose of the Study

The overall purpose of the present study was to develop an educational program based on the importance of calcium, its many uses in the body, and the varied calcium-rich food sources. A nutrition education program with the objective of increasing calcium consumption was developed and presented to second grade students. The nutrition

education program was evaluated in terms and pre- and post-test scores and before and after instruction in calcium consumption.

Specific purposes of the study were to:

- (1) Determine the adequacy of the noon meal consumed by second grade children with regard to calcium intake.
- (2) Measure nutritional knowledge (with regard to calcium) of second grade children.
- (3) Devise and test various nutrition education materials and methods.
- (4) Provide information from the above data for the development of an educational booklet for self-instruction.

Review of Literature

Calcium status in children. Many dietary surveys have confirmed the decline in calcium consumption. A 1968-1970 survey by Owen (23) of several thousand United States pre-schoolers noted calcium deficiencies at all socio-economic levels, while a 1971 Alabama sampling (25) disclosed deficient intakes of calcium to be common to all age groups surveyed. Calcium intake has been shown to be uninfluenced by socio-economic factors (other than obviously the amount of money available to spend on food) and no association has been shown between calcium intake and family income (5, 6). Findings from McGanity's 1968 Texas Nutrition Survey (17)

involving more than 1,700 families reflect that the intake of calcium may be limited in a portion of the survey families. Likewise, the 1971 Health and Nutrition Examination Survey (30) sampling of more than 10,000 persons revealed more than one-third of poverty level preschoolers with deficient calcium intakes and one-fourth of the preschoolers above poverty level with calcium intakes less than two-thirds of the Recommended Dietary Allowances published by the National Research Council.

A compendium of nutritional status studies in the United States from 1957-1967 (11) reveals approximately sixty published studies involving a total of more than 60,000 people. They all included some type of dietary evaluation. On the whole, dietary and laboratory analysis have shown ascorbic acid, Vitamin A, calcium, and iron to be the nutrients most likely to be consumed in amounts below the Recommended Dietary Allowances.

To further compound the problem, some researchers (13) have indicated that high protein diets or high intakes of phosphorous are associated with increased calcium loss. Stress has also been reported to exert an unfavorable effect upon calcium balance (7). As many as one-fourth of all U.S. women over fifty years of age have osteoporosis to a clinically important degree and Hegsted (9) has warned this

may possibly be one result of decreasing calcium intake over the years. Nordin (20) suggests that osteoporosis may be the result of lifelong inadequate calcium intake while Smith and Frame (27) contend there is no relationship between calcium intake and bone density.

Paul B. Pearson (24), past president of The Nutrition Foundation, Inc., speaking on nutrition perspectives for the seventies, states:

After iron deficiency, calcium deficiency is perhaps the one that most plagues our population.

Concern over calcium requirements of growing children prompted these statements by B. E. C. Nordin (21):

The calcium and phosphorous requirements of children are impossible to define by balance procedures because children should, by definition, be in positive balance and the degree of positive balance which is desirable is unknown.

The clinical effect of calcium deficiency in growing children is not definitely known but the effect of milk supplement on growth suggests the possibility that calcium deficiency in children might cause some retardation of growth.

Insofar as children are concerned the demands of growing bodies are great. The body of an average male five years of age contains about 200 grams of calcium. By age ten this calcium content will double and by age twenty the normal young adult will have acquired more than 40 times the amount of calcium he had in infancy. (14). It is

important that adequate calcium intake be maintained throughout life.

Nutrition education for the elementary grades. A possible solution to improvement of food habits is nutrition education. This link between scientific knowledge of nutrition and its practical application has been explained by Schneider and Helsa (26):

Nutrition is a curious science. Among the biomedical sciences it is probably unique in that although it has numerous 'hard sciences' at its core, it has numerous linkages with some of the 'soft sciences,' and through them a very real contact with many aspects of the human condition.

Gifft, Washbon and Harrison (7) base the fundamental philosophy of nutrition education on the premise that prevention is preferable to cure. Leverton (12) sees nutrition education as a multidisciplinary process involving not only the transfer of information, but the development of motivation and the appropriate modification of food habits. Todhunter (29) provides this definition of the term:

Nutrition education for the general public is the process by which beliefs, attitudes and understandings about food lead to habits that are nutritionally sound, practical and consistent with individual needs and available food resources.

McWilliams (18) states it is essential that a firm foundation in good nutritional practices be developed during the elementary years in order to facilitate the achievement of good

nutrition during the demanding years of adolescence. Martin (14) concurs:

Food habits begin at birth. Therefore, the sooner a child is surrounded with influences that develop good food habits, the better are his chances of developing a normal eating pattern.

Godshall (8) agrees that a child's habits are more easily changed during the span of the elementary years without the drastic steps necessary for accomplishment of change in later life. Todhunter (29) expands on the necessity of nutrition education:

Nutrition education is universally needed regardless of income, geographic location, cultural, social or economic patterns or level of education. There is no instinct that guides man to select those foods which meet the nutritional needs of the body. And knowledge is not inherited. Each new generation must be taught what foods to select and why, and how food affects health.

Assuming the essentiality of nutrition education, the 1969 White House Conference on Food, Nutrition and Health (31) established these goals for nutrition education:

Sound nutrition education should enable each individual, throughout his life, to make wise decisions about his food choices wherever he may be.

Goals of nutrition teaching in the primary grades were established several years ago by one of the foremost champions of nutrition education, Lydia Roberts. Martin's revision of her work (16) states that the goals of nutrition teaching in the primary grades should be simple, direct, and practical, with

emphasis on the creation of a favorable attitude toward food and the formation of good habits. Primary aims of nutrition education at this level are,

- (1) helping children like and regularly eat the foods which they need; (2) having them understand that the regular eating of certain types of food helps them grow and keep well and strong; and
- (3) encouraging good habits of sleep, rest, and play which affect their enjoyment of such foods and the amounts which they eat.

Leverton (12) feels there is no one single approach nor message that can be used in nutrition education and recommends that each program be individually tailored and related to the needs of its audience. Todhunter (29) reports that one of the earliest nutrition educators, Professor Mary S. Rose, based her teaching methods on the fundamental belief that since food makes the difference in health, it is vital to know what and how much to eat in one's daily diet. Student participation was the key to her teaching method. She allowed the children to do the talking, prepare and eat the food, conduct animal experiments, and draw their own conclusions. Osman (22) also recommends that educational experiences be provided in the form of active student involvement. Nutrition education programs should be relevant to students' needs, interests, and developmental levels. Structuring, or organization of information to be presented, appears to be of greatest value in later retention and recall, while the

positive concepts of repetition and reinforcement encourage better performance. Gifft, Washbon and Harrison (7) promote guided discovery as the means for improving understanding, retention, and application of nutritional knowledge. They define the process as "techniques which provide structured opportunities for the learner to participate in developing the cognitive base for his own ideas."

Martin's revision of Roberts' work (16) indicates that health learning occurs in three stages: (1) knowledge of desirable habits; (2) a favorable attitude toward the desirable habits; and (3) the actual acquirement of the desirable practice. She recommends a problem-solving approach to nutrition education and feels it is necessary to discover the types of activities which promote a child's nutritional learning and guide their application in the classroom in order to attain desirable nutritional practices. Her basic guidelines to nutrition education may be enumerated as follows: (1) children learn by doing; (2) experiences should be meaningful; and (3) experiences should be repeated. She contends that, "The more closely nutrition experiences are related to life about them, the better do they serve children as steps in learning" (15). Jameson (10) agrees that, ". . . knowledge, in and of itself, will not change our behavior. A critical element is how we feel about what

we know." An old Chinese proverb illustrates the desirable educational approach:

What I hear, I forget.
What I see, I remember.
What I do, I know.

The success of nutrition education programs can be demonstrated. A study by Whitehead (32) revealed that nutrition education caused significant changes in food choices of young adolescents. Gifft, Washbon and Harrison (7) report changes in specific food practices by strengthening junior high students' concepts about nutrients, food, and health. Alford and Tibbets (1) demonstrated increased acceptance of vegetables by children following nutrition education programs at a summer camp. Niedermeyer and Moncrief (19) confirmed that important nutrition skills can be taught effectively and reliably at the primary level. Presenting a nutrition education program based on the Four Food Group System, they noted an increase in post-test mean scores by 54 percent overall, with an overall post-test achievement score of 88 percent. Coleman's (3) presentation of a nutrition education program to fourth graders resulted in increased acceptance of a greater variety of foods. Individual student's ranking of foods as "liked" rose from a pre-test mean of 69.7 foods to a post-test mean of 77.4 foods, a highly significant increase of 7.7 foods per child.

If success of nutrition teaching is evident, then evaluation of such effectiveness is essential. Martin (16) suggests that progress in nutrition education might be evaluated in two ways:

(1) by measuring results of the program in terms of its objectives; and (2) by appraising the methods used in attaining the results.

In other words, evaluation of nutrition education must be concerned with both "means" and "ends." Giffit, Washbon and Harrison (7) recommend a three-fold plan for evaluation of nutritional teaching methods and programs. The evaluation plan begins with purposeful observation. Structured examination of progress follows, and research for assessment purposes concludes the appraisal. Todhunter (29) summarizes the ultimate result of purposeful nutrition education:

A dynamic nutrition program that begins in early childhood and continues through the elementary and secondary schools can help young children to acquire positive attitudes toward food and can help older children to assume responsibility for their own food selection and prepare them for adult and parental responsibility.

CHAPTER II

PROCEDURE

Preliminary investigations. Second grade children were observed in an informal pilot survey conducted in November 1975, by the Texas Woman's University Nutrition Research Lab (28). The eating habits and dietary intake records were recorded for 21 students of a small private school. Calculations revealed that children seven and eight years of age were a particularly vulnerable group with regard to consumption of calcium-containing foods. Of the small group surveyed, more than 80 percent of the youngsters six to ten years of age consumed less than $\frac{2}{3}$ of the 1974 Recommended Dietary Allowance for calcium. Marginal levels ranged from 58-90 percent of the RDA. While all children reported protein intakes from 102 percent to 350 percent above the RDA levels, 52 percent were not meeting the RDA levels for calcium. On such basis, second grade children were selected as an appropriate group for this study. It was also felt that children in this age range would respond well to the central-theme character approach of the educational program. Children at this developmental level are also very frank in their opinions and are eager to try their hand at the culinary arts.

Subjects. The thirty-four children who participated in this study were enrolled in the second grade. Twenty-four children, 11 boys and 13 girls, were enrolled in a second grade class at Woodrow Wilson Elementary School, a public school located in Denton, Denton County, Texas. The school is generally considered to be representative of middle to upper-middle income levels. Ten children, 7 boys and 3 girls, were enrolled in a second grade grouping at Fairhill School, a private school in Dallas, Dallas County, Texas. Fairhill is a small non-profit school for children who have learning disabilities with primary difficulty in reading, writing and/or arithmetic. Students have no other handicapping conditions such as physical handicaps, serious visual or hearing impairment, mental retardation, or behavior disorders. Median parental income is more than \$60,000 yearly.

Design of the study. Before the study started, the author conferred with the principals and teachers of the schools selected. Beginning and ending dates for the study were discussed in addition to planned instructional content. Classes were planned to be 45 minutes in length and were scheduled twice a week for a total of eight lessons. The instructional presentations began the week of October 25, 1976, and concluded the week of November 15, 1976.

Parents of the students were advised of the project (Appendix A) and permission was obtained prior to each child's participation in the educational project (Appendix B). Parental cooperation was also requested in completing a daily dietary for each child's food intake for one day at the beginning and conclusion of the educational project. Detailed record-keeping instructions were provided in an effort to ensure accurate information (Appendix C).

The overall concept of the instruction was to increase the children's consumption of calcium-containing foods. Specific instructional objectives were as follows:

- (1) List two reasons why the body needs calcium.
- (2) Name five foods that contain calcium.
- (3) Name four products made from milk.
- (4) Identify the number of glasses of milk needed daily by elementary school children.

As a preliminary step, the children completed a pre-test (Illustration 1) based on the instructional objectives prior to the initiation of the calcium educational program. The instrument was entitled "Calcium Quiz" and was designed to determine calcium nutritional knowledge of each child at the beginning of the study. The multiple-choice instrument contained three illustrated questions based on the planned objectives. Selected answers were to be circled by the children. To minimize differences in reading ability, each

ILLUSTRATION 1

School _____

Date _____

Name _____

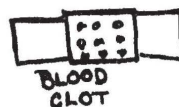
CALCIUM QUIZ

Circle the correct answer or answers.

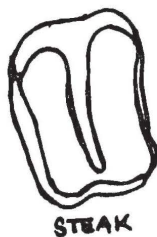
1. How many glasses of milk do you need daily?



2. Why does your body need calcium? (HINT: There are four answers)



3. Which foods are good sources of calcium? (HINT: There are six answers)



question was read aloud and thoroughly explained. At the end of the educational presentation, the test was again administered. This was done to measure the extent of the increase in the children's knowledge. It was felt by the author that the use of the same testing instrument did not influence the post-test results inasmuch as children of this age level are not "test-wise" and it was stressed that the instrument was not a part of regular classroom work or grades.

After the "Calcium Quiz" had been administered, the children were observed during lunch time and food consumption was recorded (Illustration 2) and analyzed for calcium content. Calcium content was determined by consulting the tables of food values in the Bowes and Church publication, Food Values of Portions Commonly Used, 12th edition (2). Again, after completion of the instruction, lunch-time consumption of calcium-containing foods was recorded and computed.

In addition, dietary records were kept by parents of 19 of the children for one day at the beginning of the instructional presentation. Post-instruction dietary records were obtained for 13 children (Illustration 3). Calcium content was computed by consulting the tables of food values in the Bowes and Church publication, Food Values of Portions Commonly Used, 12th edition (2).

Date .

Observer _____

[illegible]

Date _____

Observer _____

[illegible]

Office Use Only	Morning
	Time: _____

	Midday
	Time: _____

	Afternoon
	Time: _____

	Evening
	Time: _____

NAME _____

Date _____

Code No. _____

Food Diary

INSTRUCTIONS FOR RECORDING:

1. Record all foods and liquids consumed.
2. List time of day.
3. Write only one food on each line.
4. Do not write in columns marked for "office use only"
5. List food, how prepared, and amount eaten.
6. Use brand names whenever possible.

Example:
7:30 AM

1 Egg, scrambled with 1 tsp of butter

2 Biscuits, 2" in diameter

1 Tablespoon Strawberry Jelly (Kraft's)

1 Glass Homogenized Milk (8 oz)

Texas Woman's University

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ILLUSTRATION 3

The lunch observations and dietary records were used to determine whether any changes had occurred in the children's food habits with regard to consumption of calcium-containing foods.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

This study was designed to develop a nutrition education program to improve the calcium consumption of second grade children. The sample consisted of 34 children, 18 boys and 16 girls, who were enrolled in second grade classes in Dallas and Denton, Texas. Two different schools representative of varying income levels were included.

Calcium Quiz

A "Calcium Quiz," consisting of three multiple-choice questions pertaining to sources of calcium and its functions in the body, was administered at the beginning of the educational program and again at its conclusion. The purpose of the quiz was to determine present calcium nutritional knowledge of the children and to measure calcium nutritional knowledge after presentation of the educational unit.

Question No. One, "How many glasses of milk do you need daily?" asked the student to choose between zero, one, two, or three glasses of milk. Responses of the children are as follows:

	<u>Number of Glasses of Milk Needed Daily</u>			
	<u>None</u>	<u>One</u>	<u>Two</u>	<u>Three</u>
Pre-Test	2	5	6	21
Post-Test	0	4	0	30

On the pre-test, 21 correct responses (60 percent of the group) were recorded and on the post-test, 30 children (88 percent of the group) responded with the correct answer, an increase of nine correct responses, or 28 percent of the group.

Question No. Two, "Why does your body need calcium?" asked the student to indicate four responses. Possible choices included the following: eye, bone, foot, blood clot, hands, nerves-muscles, ear, teeth, and sun. Answers of the children are as follows:

	<u>Why Your Body Needs Calcium</u>				
	<u>Eye</u>	<u>Bone</u>	<u>Foot</u>	<u>Blood</u>	<u>Hands</u>
Pre-Test	22	16	18	18	13
Post-Test	9	31	5	31	6
	<u>Muscles</u>	<u>Ear</u>	<u>Teeth</u>	<u>Sun</u>	
Pre-Test	19	10	21	0	
Post-Test	23	3	27	0	

Seven children (4 percent) answered this question correctly on the pre-test. Eighteen children (53 percent of the group) responded accurately on the post-test. These 11 responses represent a 32 percent increase.

Question No. Three, "Which foods are good sources of calcium?" called for six circled answers. Milk, chicken, egg, broccoli, molasses, steak, sea food, pie, nuts, and cheese were the choices. Responses of the children are as follows:

	<u>Good Sources of Calcium</u>				
	<u>Milk</u>	<u>Chicken</u>	<u>Egg</u>	<u>Broccoli</u>	<u>Molasses</u>
Pre-Test	28	29	30	28	4
Post-Test	33	12	8	31	27
	<u>Steak</u>	<u>Sea Food</u>	<u>Pie</u>	<u>Nuts</u>	<u>Cheese</u>
Pre-Test	29	23	9	4	20
Post-Test	10	30	2	23	28

There were no correct responses to this question on the pre-test. Thirteen children answered correctly on the post-test, for an increase of 44 percent.

The mean scores of the 34 children taking the quiz were calculated for the pre- and post-tests. The t-test was used to determine the significances between group means.

The mean pre-test score was 55.3, based on a possible score of 100. This score rose to a mean of 84.6 on the post-test, an average increase of 29.3 points. This difference was highly significant (Table 1). The highest score on the pre-test by one child was 82, while 7 children scored a low of 37. On the post-test, a perfect score of 100 was attained by 13 students, while three children posted low scores of 46.

Lunch Calcium Consumption

The consumed portions of the children's noon meal were ascertained by visual observation of experienced personnel. Calcium content was then computed from standard measurements of food values in the publication by Bowes and Church, Food Values of Portions Commonly Used, 12th edition (2). Mean calcium content of the noon meal consumed by 34 students at the beginning of the educational presentation was 281.5 milligrams, more than one-third the Recommended Dietary Allowances. The mean calcium content of the noon meal when calculated at the end of the teaching unit was found to be 331.8 milligrams, a mean increase of 50.3 milligrams calcium. T-test analysis determined this increase in means was not significant (Table 2).

TABLE 1

PRE-TEST AND POST-TEST SCORES OF 34 CHILDREN

Variable	Mean	Standard Deviation	t-value	P
Pre-Test	55.3	13.5		
Post-Test	84.6	17.1		
Difference	-29.3	13.9		
			-12.50	<0.01

TABLE 2

PRE- AND POST-INSTRUCTION LUNCH CONSUMPTION OF CALCIUM
IN MILLIGRAMS BY 34 CHILDREN

Variable	Mean	Standard Deviation	t-value	P
Pre-Instruction Lunch Calcium Consumption	281.5	113.2		
Post-Instruction Lunch Calcium Consumption	331.8	163.0		
Difference	-50.3	168.6		
			-1.8	ns

Daily Calcium Consumption

Daily dietary intake records were available for 19 students for one day at the beginning of the instructional presentation although such records were available for only 13 children at the conclusion of the teaching unit. Calcium content for the 13 complete dietaries was computed by consulting the tables of food values in the Bowes and Church publication, Food Values of Portions Commonly Used, 12th edition (2). Mean daily intake of calcium for one day at the start of the unit was found to be 693.1 milligrams. Mean post-instructional daily calcium intake of the 13 children was 829.4 milligrams, an increase of 136.3 milligrams. Analysis of group means by t-test found this increase to be insignificant (Table 3).

It is common knowledge that improvements in habits do not necessarily follow increase in knowledge--especially with regard to nutrition (7). The data seem to indicate, however, that a well-planned education program can significantly increase nutritional knowledge. The enthusiastic response to the teaching methods and eager participation of the students are evidence of a gain in nutrition awareness. The stage has now been set for a favorable reception of later health education efforts.

TABLE 3

PRE- AND POST-INSTRUCTION DAILY CONSUMPTION OF CALCIUM
IN MILLIGRAMS BY 13 CHILDREN

Variable	Mean	Standard Deviation	t-value	P
Pre-Instruction Daily Calcium Consumption	693.1	309.9		
Post-Instruction Daily Calcium Consumption	829.4	380.5		
Difference	-136.3	540.5		
			-0.9	ns

Although consumption of calcium-containing foods did not increase significantly, it was interesting to note during the lunch observations that the students were changing their food habits. As a result of the molasses instructional activity, one child persuaded his mother to bake gingerbread as a replacement for the empty-caloried dessert he had previously carried in his lunch. Another student switched her luncheon beverage from a soft drink to homogenized milk and even substituted a bag of peanuts for her usual chips. Although it may have been an oddity, one participant's lunch calcium consumption actually doubled by the time of the post-instruction observation.

The daily dietaries kept by some of the parents were even more revealing. Although there were ups and downs and the increase was not significant, it is interesting to note that while mean pre-instruction daily calcium consumption was 15 percent below the Recommended Dietary Allowance of 800 milligrams, mean post-instruction calcium consumption surpassed the RDA by nearly four percent. One mother's post-instruction dietary record reflected she had prepared granola from the recipe in "Calvin's Calcium Cookbook," the take-home cookbook presented to the children. Another mother reported increased consumption of seafood items around her

house as a result of the nutrition education project. It was also noted that there seemed to be a trend toward increased consumption of dairy products, particularly ice cream and cheese.

In assessing the success of this nutrition education program, it must be remembered that children of this age have limited control over their diets. To a large extent, parental prejudices and attitudes influence the content of the grocery basket. In this context, one must first educate the parents. It is therefore interesting to speculate on the volume of nutrition news the children must have undoubtedly relayed to their parents. Even though increases in calcium consumption were modest, it is evident that the "glad tidings" did not fall on deaf ears.

CHAPTER IV

NUTRITION EDUCATION PROGRAM

The educational program was divided into eight units (Illustration 4). Unit One, "What is Calcium?" followed the pre-test. The concept of calcium as a mineral was introduced by passing test tubes of calcium carbonate among the children. A test tube of calcium remained on the science table in the classroom until the following lesson. A science experiment demonstrated that calcium is needed for strong bones and teeth wherein a chicken bone was placed in vinegar and left on the science table along with the test tube of calcium. The vinegar leached the calcium from the bone and the rubbery bone was examined eagerly by the children who concluded that the calcium made the bone strong. Giant-size bandaids were used to illustrate the need for calcium in the formation of blood clots. A sing-song riddle with accompanying arm movements portrayed calcium's role in nerve transmission. Pictures of animals who were fed a balanced diet which included milk were compared with those of animals that received no milk in their diet. A word scramble activity (Appendix D) designed by the author was completed by the children.

ILLUSTRATION 4

OUTLINE OF NUTRITION EDUCATION PROGRAM

UNIT I - WHAT IS CALCIUM?

Lesson One

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Calcium is a mineral.	Pass sample of calcium for observation.	Calcium carbonate Test tube and stopper
Calcium is needed for strong bones and teeth.	Soak chicken bone in vinegar overnight.	Chicken bone Vinegar (4.5% acidity) Small glass jar and lid
Calcium is needed for formation of blood clots.	Examine large bandaid and allow spontaneous class participation.	Large bandaid (Johnson & Johnson brand)
Calcium is necessary for nerve transmission.	Move arms to demonstrate voluntary muscle control. Sing activity song.	"Guess who helps me make a muscle, Raise my arms up to the sky? Make a circle big and wide? It's Calcium - My-Oh-My !
Calcium is necessary for growth and health.	Discuss poster illustrating differences in size of animals receiving milk in their diet. Word scramble activity	Poster "Milk Made the Difference" available from National Dairy Council, Chicago, Illinois "Can you Unscramble these Words?" activity sheet

UNIT II - FOODS THAT CONTAIN CALCIUM

Lesson Two

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Many foods contain calcium.	Slide-tape presentation Sing "Calvin's Song"	Slide-tape presentation - "Calvin J. Calcium Tells All About Calcium" Slide projector, Tape recorder "Calvin's Song" activity sheet
Milk is a source of calcium which comes in many forms.	Sample different milks.	Half-n-Half, Chocolate, 2%, Homogenized, Skim, Buttermilk Small 1 oz. medicine cups
Children need three glasses of milk daily.	Pour milk into three numbered glasses and let children "count it out."	Three 8 oz. glasses Black plastic numerals 1, 2 and 3
Many products are made from milk.	Sample different kinds of cheese.	Gourmandaise, Tillsiter, Bleu, Gloucester, Camembert, Danish, Sage, Cheez Kisses Small paper plates Napkins

UNIT II - FOODS THAT CONTAIN CALCIUM**Lesson Three**

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Almonds, pumpkin seeds, soybean seeds, and sesame seeds are sources of calcium.	Display and sample various nuts and seeds.	Covered "Guess What" box containing almonds, pumpkin seeds, soybean seeds, and sesame seeds Small paper plates
	Make individual place mats and illustrate with magazine cutouts of calcium-rich foods.	Roll of wallpaper (use the reverse side for backing) Clear contact paper Magazine pictures of calcium containing foods Construction paper cutouts of Calvin and title cards Scissors
	Sample granola.	Granola 3 oz. cups Paper napkins

Lesson Four

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Molasses is a source of calcium.	Read story about production of molasses and examine sugar cane.	<u>Let's Learn About Sugar</u> , by M. Petersham. Irvington-on-Hudson, New York: Harvey House, Inc., 1969. Stalk of fresh sugar cane
	Sample sugar cane and molasses.	Sugar cane chips Molasses 1 oz. medicine cups Plastic spoons
	Make gingerbread boys.	Gingerbread dough Aluminum pie plates Raisins, Almonds, Sesame Seeds

Lesson Five

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Collards, kale, broccoli and other greens are sources of calcium.	Display and sample greens, collards and broccoli.	Uncooked collards, kale, broccoli, mustard greens Cooked collards and broccoli
	Hidden word puzzle activity	"Find the Hidden Words" activity sheet

UNIT II - FOODS THAT CONTAIN CALCIUM

Lesson Six

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Shrimp, salmon, sardines, oysters and clams are sources of calcium.	Display and discuss various marine sources of calcium. Explain why some of these foods are good sources. Offer samples of shrimp, kippered herring, oysters and minced clams Prepare Sooper Dooper clam dip Coloring activity	Shrimp, sardines, kippered herring, oysters, clams, salmon, tuna Clam dip ingredients Crackers Plastic knives Small paper plates Napkins "I'm Full of Calcium-Rich Foods" activity sheet

Lesson Seven

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
Many food foods made with milk and dairy products are sources of calcium.	Complete maze activity Discuss foods made with milk - class participation. Prepare chocolate instant pudding using non-fat dry milk powder. Prepare Confetti Cheese Dip to serve with raw vegetables and crackers	"Calvin's Maze" activity sheet Non-fat dry milk Chocolate instant pudding 12 oz. styrofoam cups and lids Plastic spoons Napkins Cheese dip ingredients Raw carrots, cauliflower Crackers

Lesson Eight

<u>Concept</u>	<u>Learning Activity</u>	<u>Supplies</u>
We have learned many things about calcium.	Class discussion of previous lessons. Hidden picture activity Distribute "I Like Cal" badges to students. Distribute take-home cookbook "Calvin's Calcium Cookbook" to students.	"Find the Hidden Picture" activity sheet "I Like Cal" badges

Unit Two, "Foods that Contain Calcium," was introduced by a slide-tape show produced by the author. During the slide show, the central figure of the educational unit, "Calvin J. Calcium," was introduced. The theme figure was a shiny white papier mâché bone-shaped manlike figure designed and constructed by the author. Calvin was approximately 12 inches high and his movable arms were used to hold calcium-containing foods. The figure was enthusiastically received by the children. The slide-tape presentation was approximately 20 minutes in length and introduced the concepts of the educational unit in addition to illustrating many of the calcium-containing foods. An illustrated copy of "Calvin's Song" (Appendix E) was presented to each child. "Count-down time" followed the slide-tape presentation as the children counted the number of glasses of milk needed daily while the author poured milk into gaily decorated numbered glasses. At a milk and cheese tasting party, children were offered samples of skim, low-fat, homogenized, half-n-half, and chocolate milk in addition to buttermilk. The milk samples were offered in this order so that the children could taste the increasing fat content of the milk. The cheese tasting was planned to introduce the children to a variety of cheese. The familiar cheddar was bypassed in order to include Gournamdaise, Swiss, Gloucester, Tilsiter,

Danish, Bleu, Camembert, and sage cheese in addition to individually wrapped processed Cheez Kisses. The sources of the various cheeses were discussed.

Food sources of calcium were introduced in Unit Three, "Molasses is a Source of Calcium." The author related the sugar processing cycle to the children and a large sugar cane was used to illustrate the molasses-making process. Samples of chewy sugar cane and sweet molasses were offered. Various ways of eating molasses were discussed and the discussion was steered to gingerbread to introduce that unit's activity--the making of gingerbread boys. Each child was given his own dough and a free hand with raisins, almonds, and sesame seeds for nutritious adornments. Each shaped gingerbread man was labeled and housed in an aluminum pie plate for baking and a safe return the following lesson day.

Unit Four, "Collards, Kale, Broccoli, and Other Greens are Sources of Calcium," was eagerly anticipated by the children. It is thought that the enthusiastic reception was prompted by the baked gingerbread men awaiting sampling at the end of that lesson. Displays of uncooked greens were discussed and samples were offered to the children. Cooked collards and broccoli were also offered. A hidden word puzzle, "Find the Hidden Words," (Appendix F) composed by

the author, was completed by the children. The high point of the unit obviously was the eating of the completed and baked gingerbread men.

Unit Five's concept, "Almonds, Nuts, and Seeds are Sources of Calcium," was introduced by a "guess what box" presented by the author during which the children learned the identity of various nuts and seeds hidden in the box. Samples were offered of all nuts and seeds and many of the foods containing nuts and seeds were discussed. The children then made place mats featuring Calvin cut-outs (Appendix G), and chose pictures of calcium-containing foods to personalize their place mats. Individual cups of crunchy granola made by the author were presented to each child to christen the new place mats.

Unit Six, "Seafood is a Source of Calcium," revolved around introducing some of the many marine sources of calcium. Samples of shrimp, sardines, kippered herring, oysters, and minced clams were displayed for tasting. Each child participated in preparing a minced clam and cream cheese dip to sample with crackers. A coloring and learning activity, "I'm Full of Calcium-Rich Foods," (Appendix H) prepared by the author, concluded the presentation.

Unit Seven's lesson, "Many Good Foods Made with Milk and Dairy Products are Sources of Calcium," was also

enthusiastically received. A maze activity (Appendix I), designed by the author to represent good sources of calcium enabled the children to help Calvin locate his milk hidden throughout the maze. Afterwards, the many foods that could be prepared with milk and dairy products were discussed with each child contributing at least one food item. Non-fat dry milk and instant pudding were used to prepare individual servings of chocolate pudding in a paper cup. Again, the children participated in preparing a food item and pimiento cheese dip was sampled with crackers and raw vegetable dippers.

Lesson Eight concluded the educational presentation. During this program, the children discussed the lessons and learning opportunities they had been presented. A hidden picture activity (Appendix J) was completed and decorated by the children. The post-test was administered. Afterwards, the students were presented large, round, white badges proclaiming, "I Like Cal" as evidence of successful completion of the nutritional project.

Because so many of the children had expressed interest in repeating their classroom cooking recipes at home, "Calvin's Calcium Cookbook," (Appendix K) was developed by the author. The booklet contained copies of all recipes

prepared by the students in addition to other calcium-rich treats. Many of the activity sheets were colored and made into a take-home notebook.

CHAPTER V

SUMMARY

The overall purpose of the study was to develop and present an educational program based on the importance of calcium, its many uses in the body, and the varied calcium-rich foods. The nutrition education program was presented to 34 students in two elementary schools in Denton and Dallas, Texas.

The overall concept of the instruction was to increase the children's consumption of calcium-containing foods. Specific instructional objectives of the program were as follows:

- 1) List two reasons why the body needs calcium.
- 2) Name five foods that contain calcium.
- 3) Name four products made from milk.
- 4) Identify the number of glasses of milk needed daily by elementary school children.

The educational program was divided into eight units. The concept of calcium as a mineral used in many ways in the body was demonstrated by simple scientific experiments. Food sources of calcium were introduced to the children both by tasting sessions and cooking activities. An exceptionally popular undertaking proved to be the making and decorating

of gingerbread boys. The central figure of the educational presentation was "Calvin J. Calcium," a shiny white papier mâché bone-shaped manlike figure designed and constructed by the author. Several puzzle-type activity sheets designed by the author provided reinforcement of the learning process as well as a challenging exercise. A cookbook containing recipes for all foods prepared in class, in addition to other nutritious calcium-rich treats, was a take-home present for each child. A large white "I Like Cal" badge, visible symbol of successful completion of the project, offered many chances for each child to share his nutritional information.

Three instruments were prepared for use in the study and evaluation of the overall success of the instruction. A testing instrument entitled "Calcium Quiz" was developed in accordance with the instructional objectives and administered both at the beginning of the educational program and again at its conclusion. The instrument was used to determine the students' present calcium nutritional knowledge and to measure such knowledge after presentation of the teaching unit. Lunch observations were conducted and dietary records were evaluated to determine whether any changes had occurred in the children's food habits with regard to consumption of calcium-containing foods. The data were analyzed to

determine changes in calcium nutritional knowledge and changes in calcium consumption as reflected by the children's dietary habits.

Mean pre-test score attained by the children was 55.3 points while post-test scores increased to a mean of 84.6 points, an increase of 29.3 points. Statistical analysis proved this gain in group means to be highly significant ($P < 0.01$).

Calcium content of the students' lunches was calculated both before and after the educational program. Mean pre-instruction lunch consumption was 281.5 milligrams calcium. Computation of mean post-instruction calcium consumption reflected a mean intake of 331.8 milligrams, an increase of 50.3 milligrams. This increase, however, was insignificant statistically.

Daily dietary records were obtained for 19 children at the beginning of the educational presentation and for 13 children at the conclusion of the unit. Calculation of the calcium content of 13 students' daily diets revealed the pre-instruction mean intake to be 693.1 milligrams and post-instruction mean consumption to be 829.4 milligrams. Upon analysis, this 136.3 milligram increase proved to be statistically non-significant.

Although not subject to statistical analysis, individual observed incidents of increased calcium consumption were numerous. Students seemed to increase their intake of ice cream and cheese as a result of the instruction. Several students began to consume the specific foods discussed in class while others substituted more nutritious foods for the previous "empty calories" that filled their lunch boxes.

The data reveal that a well-planned nutrition education program can significantly increase the nutritional knowledge of students, although this increase is not necessarily coupled with a corresponding change in dietary habits. If enthusiasm and class participation may be included in the criteria necessary for successful achievement of instructional objectives, then this educational program has surpassed the author's expectations and the students have received a firm foundation on which to build their nutritional knowledge.

APPENDIX A

PARENTAL INFORMATION LETTER

TEXAS WOMAN'S UNIVERSITY

P.O. Box 23975
DENTON, TEXAS 76204



TWU RESEARCH INSTITUTE
HUMAN NUTRITION RESEARCH
NELDA CHILDREN STARK LABORATORY

October 18, 1976

PHONE (817) 682-5611

Dear Parent,

It is well known that various factors affect the nutritional needs of children. Currently, members of the Human Nutrition Research team are interested in studying calcium intake of elementary school children. Your child has been selected to participate in a special four week school study related to nutrition education and daily calcium intake.

This nutrition education project will increase your child's knowledge of the importance of calcium and its many uses in the body. Through tasting sessions he will be exposed to many foods that are important sources of calcium and even have a chance to try some classroom cooking!

All research involves the cooperation of many people and we need your help in order to give your child these educational benefits. Here's exactly how you may allow your child to join this exciting project.

1) Please read and sign the enclosed consent form and return it to Texas Woman's University in the enclosed self-addressed stamped envelope. We MUST have the signed consent form before your child will be able to participate in this project. If you have any questions whatsoever, please give us a call.

2) One important phase of the project is the adequacy of your child's calcium intake. With your assistance, the Human Nutrition Research team will provide you and your child with this information.

We are asking you to keep a one day record of your child's food intake. That means we want to know the amounts of every food item your child eats for one day. We are enclosing a special form for your use in recording this information.

Please record your child's food intake for ONE of the following days only --- October 25th or October 26th or October 27th. If you have any questions at all about the correct procedure, please call me. After completion of the one day food intake record, please return the diary to TWU in the enclosed self-addressed stamped envelope.

Page 2

3) We will be sending another dietary record form to you at the end of November for your use in recording another day's food intake. By calculating your child's calcium intake before and after the educational project, we will be able to evaluate the effectiveness of our instruction and give you more specific information concerning your child's calcium nutritional status.

4) Let your child tell you all about the project as it progresses. If you feel that your child is enthusiastic about the educational sessions, please give us a call. We always like to hear good news and welcome your comments.

This little check list summarizes what you must do in order for your child to participate in this exciting project:

TODAY	Sign and return the consent form in the enclosed envelope.
October 25, 26, or 27	Record your child's food intake for one of these days and return in the enclosed envelope.
November 22, 23, or 24	Record your child's food intake for one of these days and return to TWU.

We are looking forward to working with your child.

Sincerely yours,

Dianna C. Blankenship
Research Assistant
(817) 387-2822 or (817) 382-5611

M. Rita Thomas, Ph.D.
Coordinator

ab
Enclosures

APPENDIX B

PARENTAL CONSENT FORM

CONSENT FORM

Human Nutrition Research
Texas Woman's University
Denton, Texas 76204

I hereby understand that _____ has been selected for a special study related to nutrition and daily calcium intake. I am willing for (him/her) to participate in this study. In addition, I hereby agree to provide dietary record keeping necessary for two days during the initial and final period of the study.

I understand that I will receive a full report of the findings. All data will remain anonymous and my child's name will not be released in any connection whatsoever with this study. Furthermore, I understand that there are no anticipated risks and no physical examination or treatment involved. I have listed below any food allergies which my child may have.

Date: _____ Signature _____
_____ Address _____
Phone _____
Case No. (For Office Use Only) _____

APPENDIX C

PARENTAL DIETARY INSTRUCTIONS

TEXAS WOMAN'S UNIVERSITY
P.O. Box 23975
DENTON, TEXAS 76204



November 18, 1976

TWU RESEARCH INSTITUTE
HUMAN NUTRITION RESEARCH
NELDA CHILDREN STARK LABORATORY

PHONE (817) 382-5611

Dear Parent,

Thank you for your enthusiastic response! From all indications, our calcium educational project has been a huge success. The children have enjoyed the "taste and learn" sessions and we have discovered some very creative classroom cooks.

Now that our project has drawn to a close, we are again asking your cooperation in order that we might evaluate the effectiveness of our instruction. Please record your child's food intake for ONE of the following days only --- November 22nd or November 23rd or November 24th. We are enclosing a dietary form for your use and ask that you write down the amounts of every food item your child eats during the diet period. After completion of the one day food intake record, please return the diary to TWU in the enclosed self-addressed stamped envelope. If you have any questions at all about the correct procedure, please give us a call at (817) 387-2822 or (817) 382-5611.

It is very important that this second food diary be completed so that we can furnish you accurate information concerning your child's calcium nutritional status. Just as soon as we receive this diary, we can begin our calculations and will promptly advise you of the results.

Here's that final timetable again:

November 22 or 23 or 24	Record your child's food intake for one of these days and return to TWU in the enclosed self-addressed stamped envelope.
-------------------------	--

We have enjoyed working with your child and appreciate your participation in this nutrition education project.

Sincerely yours,

Dianna C. Blankenship
Research Assistant

M. Rita Thomas, Ph.D.
Coordinator

:ab
Enclosures

DIETARY RECORD KEEPING

DIRECTIONS:

1. List everything that the child eats or drinks. Include snacks and any other snack-related foods or beverages.
2. Indicate, as closely as possible, the correct quantity (measure, weight, size or count) of food or beverage eaten.
3. Whenever you can, indicate brand names.
4. List and indicate quantity of food and/or beverage eaten away from home.

OTHER INFORMATION:

When recording the foods and/or beverages eaten, take into account the following:

COOKING METHODS: Indicate if food item was boiled, fried, baked, etc. If mixed dishes or home recipes were used, show major food items in each one (Example: tuna fish and noodles; macaroni and cheese; sandwich - 2 slices of bread, 2 ounces of ham, 1 lettuce leaf, 1 slice of tomato, 1 teaspoon of salad dressing, etc.).

JUICES: List type of juice and quantity consumed ($\frac{1}{4}$ cup or $\frac{1}{2}$ cup or 1 cup, etc.).

FRUITS: Indicate if canned, fresh, dried, frozen or cooked with added sugar. If canned, was it canned in thick syrup or water. Indicate number of pieces and size (Example: small, medium or large apple). How much was eaten (Example: 1 small sauce dish - $\frac{1}{2}$ measuring cup).

VEGETABLES: Indicate if canned, frozen, fresh, or cooked with butter or other fat. Beans and salads are also part of this category. Show how much was eaten in rounding tablespoons or in parts of a measuring cup ($\frac{1}{4}$ cup, $\frac{1}{2}$ cup, 1 cup). One small saucer of vegetables - $\frac{1}{2}$ cup - 4 rounding tablespoons.

CEREALS: Is it dry or cooked? Show how much in tablespoons or in parts of a measuring cup was eaten. Small, individual boxes of dry cereal have the weight listed on the box - show this weight. Also, list brand names on cereals.

BREADS: If bought as sliced bread how many slices were eaten? If not, tell thickness as 1 biscuit - 2 inches wide or whatever it is. Indicate type of bread (whole wheat, rye; bran, etc.) crackers, bread sticks, muffins, etc. are also part of this category.

BUTTER AND/OR MARGARINE:

Indicate quantity by level teaspoons. (1 pat - 1 level teaspoon). Be sure to list the butter or margarine used on potatoes, bread, or vegetables.

-2-

EGGS OR EGG SUBSTITUTES:

Indicate type of egg used, also if it is a whole egg or yolk only. Show if it is fried, poached, scrambled, or boiled and how many were eaten.

BACON OR BACON SUBSTITUTES:

How many slices - tell if they are long (full length) slices or $\frac{1}{2}$ slices.

MILK:

Indicate what kind - nonfat dry milk, low fat (2%), whole milk homogenized. Amount on cereal - show in parts of measuring cup. If cream is used tell if it is light, medium, or heavy. Milk for drinking: how much consumed in parts of a measuring cup. Indicate kind and quantity of chocolate or other flavorings added to milk (Quick, Instant Breakfast, Hershey's, etc.).

SUGAR AND OTHER SWEETENERS:

Indicate type and quantity (in level teaspoons) of sugar or sugar substitute used.

MEAT, FISH OR CHICKEN:

Weigh out cooked portion on scales and show how many ounces were eaten. One small serving meat or fish - 1 ounce - 2 tablespoons, 1 average serving meat or fish = 3 ounces, 1 large serving meat or fish = 4 ounces. Tell how many pieces of chicken were eaten and tell if they were drumsticks, breasts, thighs, etc. Describe if meat, fish or chicken was fried, boiled, stewed, roasted, baked, broiled. Specify type of luncheon meats and how many slices were eaten.

DESSERTS:

Indicate kind and how much was eaten in parts of measuring cup size of each slice or count. List cookies eaten; tell kind and how many eaten.

OTHER FOODS:

Indicate how much was eaten in terms of cups, tablespoons, teaspoons, or how many pieces. Examples: jams, jellies, snack foods, chips, dips, slurpees, icees, carbonated beverages, candy bars, etc.

SALT:

Is extra salt added at the table to most food ____ yes ____ no?

After carefully reading the directions, RECORD the foods that your child eats on the following pages. RETURN the completed questionnaire by mail.

APPENDIX D

WORD SCRAMBLE ACTIVITY SHEET

CAN YOU UNSCRAMBLE THESE WORDS?

(Hint: They all contain Calcium)

L S C A M

A S D R I N S E

T E U B T R

L A K E

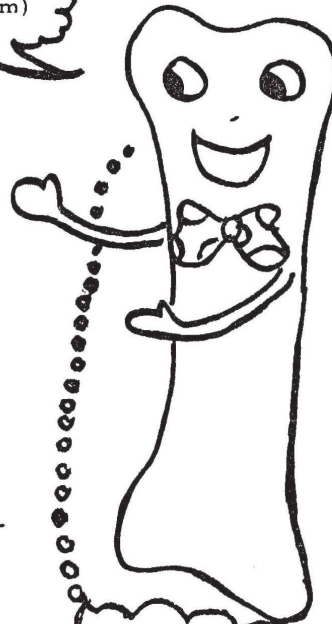
N T S U

U D I G P D N

E H E S C E

U G R T O Y

N R E G E S



BIG HINT: Choose from these words!

Almonds
Cottage Cheese
Buttermilk
Kale
Butter
Nuts
Cheese
Molasses
Sardines
Salmon
Clams
Oysters
Yogurt
Pudding
Custard
Greens
Seeds
Collards
Broccoli

APPENDIX E

CALVIN'S SONG ACTIVITY SHEET

CALVIN'S SONG

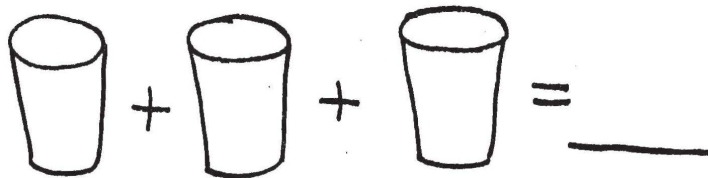
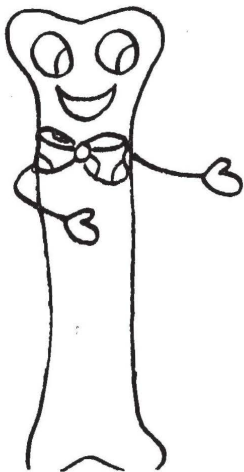
Three glasses of Milk a day

Whether at home or school or play,

Will help your body GROW

Nice and strong, straight and tall,

'Cause good health is the best of all!



APPENDIX F

HIDDEN WORD ACTIVITY

FIND THE HIDDEN WORDS

There are six words related to calcium hidden in the word scramble below.

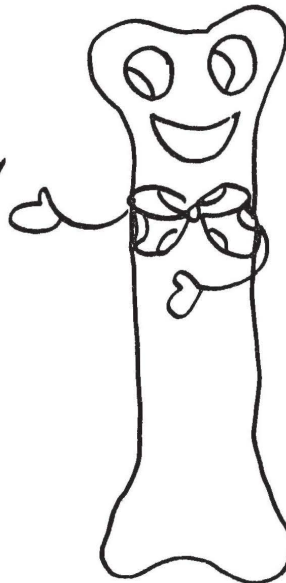
See if you can find them. Circle the ones you find.

X	C	A	L	C	I	U	M	D
S	L	S	E	E	D	S	I	L
E	A	O	K	R	K	A	L	E
R	M	O	H	S	T	X	K	C
S	S	C	H	E	E	S	E	R

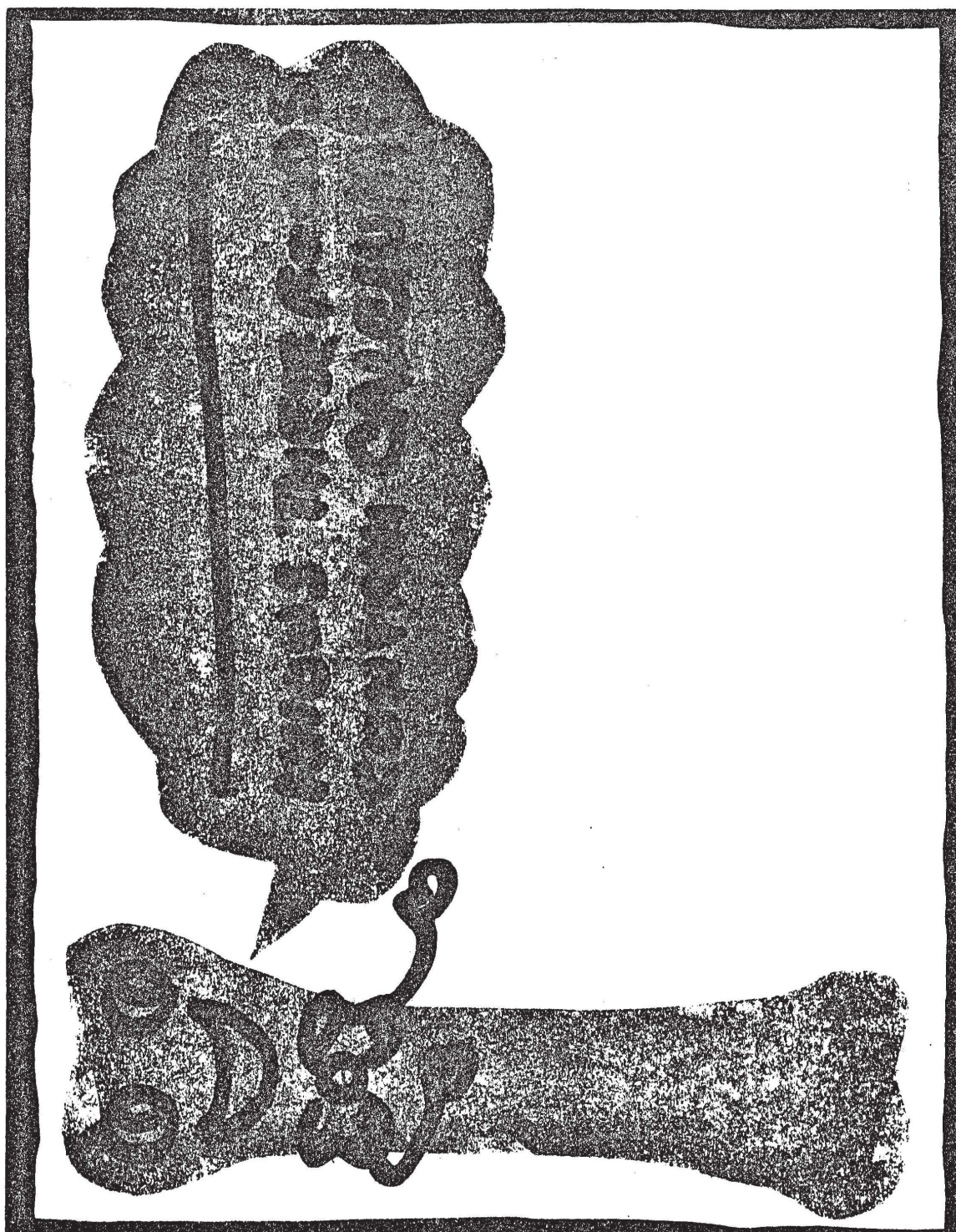
HINT:

These are the words hidden in the scramble:

Calcium	Seeds
Kale	Clams
Milk	Cheese



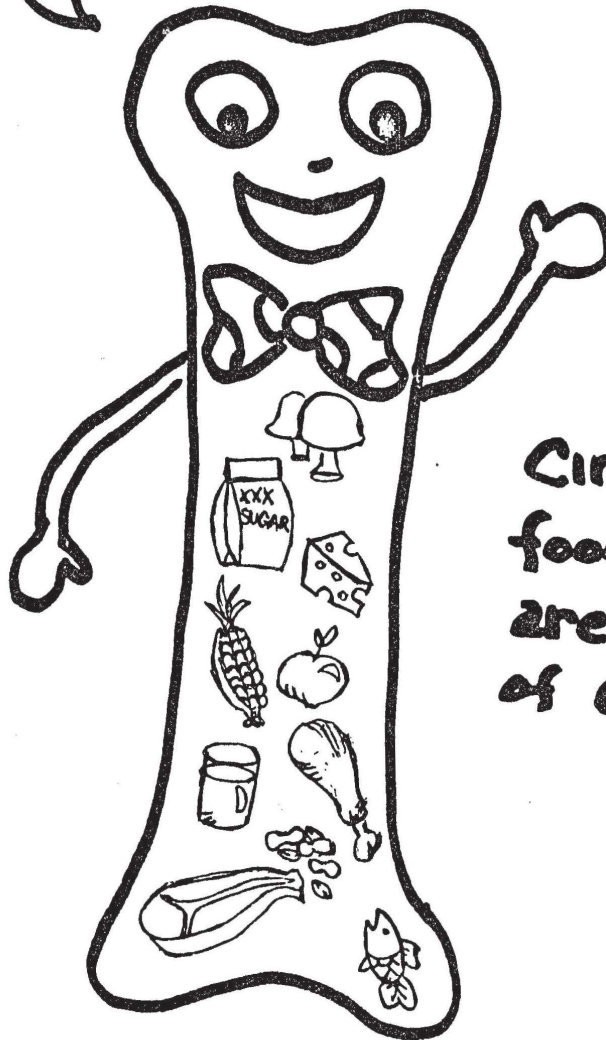
APPENDIX G
PLACE MAT ACTIVITY



APPENDIX H

CALCIUM-RICH FOODS ACTIVITY SHEET

I'm full of calcium-rich foods



Circle the
foods that
are sources
of CALCIUM.

APPENDIX I

MAZE ACTIVITY SHEET

HELP CALVIN
FIND THE 3
GLASSES OF
MILK!



APPENDIX J

HIDDEN PICTURE ACTIVITY

FIND THE HIDDEN PICTURE

```

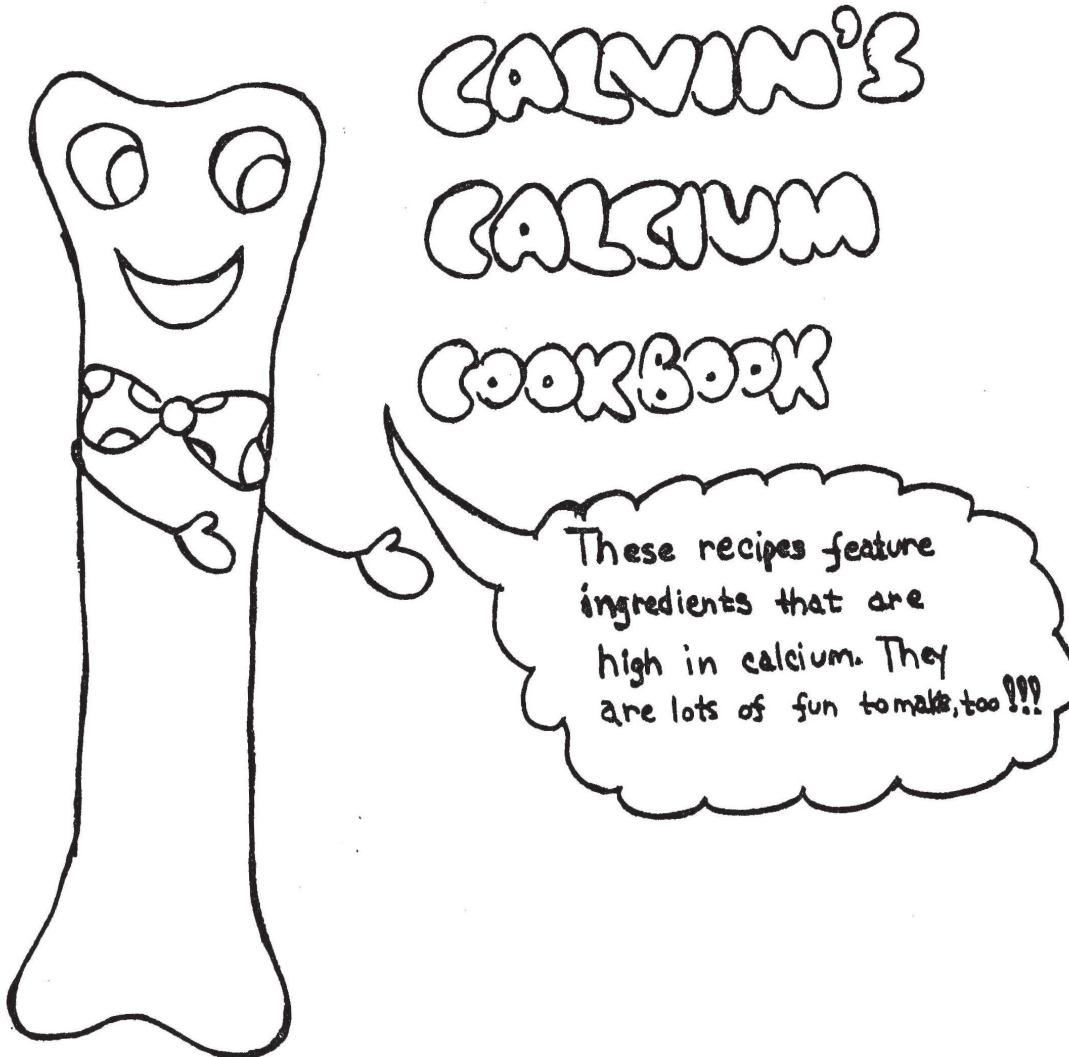
1 2 1 2 1 2 4 1 2 6 1 2 16 6 62 2 1 2 26 2 1 2
2 1 2 1 2 1 2 1 3 1 2 1 2 1 23 1 2 1 2 1 2 2 1
  1 2 1 2 3 2 3 1 2 3 1 3 2 1 2 1 2 1 2
  2 1 2 3 1 2 3 3 4 2 1 2 3 1 2 1 2 1 2 1
6 4 64 3 84 6 4 8 9 5 6 3 4 6 7 4 5 4 5
4 5 4 4 5 3 9 5 8 4 4 5 3 5 4 4 8 5 5 4 54
1 1 1 3 1 2 1 1 3 1 1 4 1 1 1
7 2 2 3 2 4 2 3 2 2 2 2 2 2
8 4 4 4 3 4 4 4 3 4 4 4 4 4 4
  3
3 3 9 9 3 9 9 9 3 9 9 3 3 9 9
3 6 6 6 6 6 6 6 6 3 6 6 3 6 6
  8 3 8 8 3 8 8 8 3 8 3 8 3 8 8
  3 3 3 3 3 3 3 3 3 3 3 3 3 3
  8 3 8 3 3 8 5 8 9 3 6 6 7 8 9 0
  3 3 3
9 7 7 6 3 6 7 8 6 7 8 9 0 9
  3
9 4 5 3 4 5 4 7 6 8 9 0 8
  3
5 2 4 3 4 5 6 6 7 8 9 9 7 6
  3
4 5 5 3 6 7 7 7 3 7 6 5 4 7
4 5 6 3 4 2 1 1 3 1 1 1 1 6 7
  3
5 4 7 5 6 3 3 3 6 7 3 6 7 8 8
  3
4 5 3 5 6 3 6 3 7 2 3 8 6 7 8
  3
2 4 1 2 3 1 3 1 2 3 4 3 4 3 2 8 4 2 1
6 7 8 4 2 4 5 6 7 8 9 9 0

```

DIRECTIONS: Circle the numbers that tell how many glasses of milk you need a day. When each one of these numbers is circled, a picture will appear. First one through is the Winner!

APPENDIX K

CALVIN'S CALCIUM COOKBOOK



THIS COOKBOOK BELONGS TO:

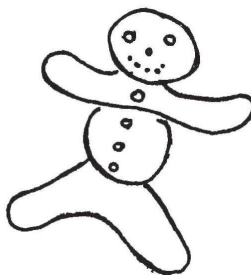
GINGERBREAD BOYS

Cream together:

- 1 cup vegetable oil
- 1 cup sugar
- 1 egg

Add and Chill:

- * 1 cup Molasses
- 2 Tbsp. vinegar
- 5 cups flour
- 1 1/2 tsp. soda
- 1 1/2 tsp. salt
- 2 tsp. ginger
- 1 tsp. cinnamon
- 1 tsp. cloves



Pinch off 4 pieces of dough approximately the size of a walnut.

Mash 1 ball for the head.

Mash 1 ball for the body.

Roll 2 balls for arms and legs into ropes about 4 inches long.

Place on cooky sheet when forming gingerbread boy.

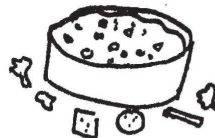
Add raisins, almonds, sunflower seeds, sesame seeds, etc. for eyes, nose, mouth and buttons.

Bake at 350° until brown - about 8-10 minutes.

Makes approximately 24 gingerbread boys.

CONFETTI DIP

- * 3 oz. package cream cheese, softened
- * 4 oz. cheddar cheese, grated (about 1 cup)
- 1 Tablespoon pimento, chopped
- 2 Tablespoons salad dressing
- 2 Tablespoons sour cream
- 1 Tablespoon mayonnaise
- 1 Tablespoon minced parsley



Blend cream cheese with fork until softened. Stir in grated cheese. Fold in remaining ingredients. Serve with crackers or fresh raw vegetables. Makes about 1 1/2 cups.

* Source of Calcium

GROOVY, GREAT GRANOLA

Heat together in large saucepan:

- 1/2 cup butter or margarine
- 1/2 cup honey
- 1 tsp. vanilla



Remove from heat. Add the following ingredients and mix well.

- * 2 cups rolled oats
- 2 cups ready-to-serve whole wheat cereal flakes
- * 1 cup sunflower seeds
- * 3/4 cup sesame seeds
- 1 cup raisins
- * 1/2 cup chopped almonds
- 1/2 cup flaked coconut

Spread in greased 13 x 9" baking pan. Bake at 350° for 15 to 20 minutes or till golden. Cool and remove from pan. Store tightly covered. Makes about 8 cups.

SOOPER DOOPER CLAM DIP

- * 3 oz. package cream cheese, softened
- 1 tsp. lemon juice
- 1 drop onion juice
- 1/2 tsp. Worcestershire Sauce
- dash salt
- * 7 1/2 oz. can minced clams, drained
- 1 tsp. chopped parsley



Combine all ingredients except clams and parsley. Beat till light and fluffy with mixer. Stir in drained clams and parsley. Serve with crackers or fresh raw vegetables. Makes about 3/4 cup.

FRUIT SHAKE

Combine in a one quart plastic container:

- 2 cups cold juice (orange, pineapple or grape)
- * 1/2 cup powdered milk
- 1 drop vanilla



Add crushed ice and shake till mixed. Serves 4-6.

* Source of Calcium

LIST OF REFERENCES

1. Alford, Betty B., and Tibbits, Mary H. "Education Increases Consumption of Vegetables by Children." Journal of Nutrition Education 3 (Summer 1971):12-14.
2. Bowes, Anna DePlanter, and Church, Charles F. Food Values of Portions Commonly Used, 12th ed., revised by Charles F. Church and Helen N. Church. Philadelphia: J. B. Lippincott Company, 1975.
3. Coleman, Jimmie Griffith. "Influence of Nutrition Education on Food Acceptance of Fourth Grade Children in Selected Schools." Master's thesis, Texas Woman's University, 1967.
4. Consumer and Food Economics Research Division, Agricultural Research Service. "Dietary Levels of Households in the United States, Spring, 1965." U.S.D.A. Household Food Consumption Survey, 1965-66, Report No. 6, 1969.
5. Fox, Hazel; Fryer, Beth A; Lampkin, Glenna; Vivian, Virginia M.; and Eppright, Ercel S. "Diets of Pre-school Children in the North Central Region." Journal of the American Dietetic Association 59 (September 1971):233-237.
6. Futrell, Mary F.; Kilgore, Lois T.; and Windham, Frances. "Nutritional Status of Black Preschool Children in Mississippi." Journal of the American Dietetic Association 66 (January 1975):22-27.
7. Gifft, Helen H.; Washbon, Marjorie B.; and Harrison, Gail G. Nutrition, Behavior, and Change. Englewood Cliffs: Prentice-Hall, Inc., 1972.
8. Godshall, Frances R. Nutrition in the Elementary School. New York: Harper and Brothers, 1958.
9. Hegsted, D. Mark. "Nutrition, Bone and Calcified Tissue." Journal of the American Dietetic Association 50 (February 1967):105-111.

10. Jameson, Dee Dee. "What Do They Know from Bacon and Eggs?" Childhood Education 51 (January 1975):146-149.
11. Kelsay, June L. "A Compendium of Nutritional Status Studies and Dietary Evaluation Studies Conducted in the United States 1957-67." Journal of Nutrition 99 (Suppl. I) (May 1969):123-167.
12. Leverton, Ruth M. "What is Nutrition Education?" Journal of the American Dietetic Association 64 (January 1974):17-18.
13. Magess, Richard B., and Mather, Warren. "Bone Mineral Content of North Alaskan Eskimos." American Journal of Clinical Nutrition 27 (September 1974):916-925.
14. Martin, Ethel Austin. Nutrition in Action. New York: Holt, Rinehart & Winston, 1963.
15. _____. Nutrition Education in Action: A Guide for Teachers. New York: Holt, Rinehart & Winston, 1963.
16. _____. Roberts' Nutrition Work with Children. Chicago: The University of Chicago Press, 1954.
17. McGanity, William J. "Nutrition Survey in Texas." Texas Medicine 65 (September 1969):40-45.
18. McWilliams, Margaret. Nutrition for the Growing Years. New York: John Wiley & Sons, 1967.
19. Niedermeyer, Fred C., and Moncrief, Michael H. "Primary Graders Study Nutrition." The Elementary School Journal 75 (February 1975):305-310.
20. Nordin, B. E. C. "Calcium Balance and Calcium Requirement in Spinal Osteoporosis." American Journal of Clinical Nutrition 10 (May 1962):384-390.
21. _____. "Calcium Requirements." The Practitioner 212 (Special Number) (March 1974):474-478.
22. Osman, Jack D. "Nutrition Education: Too Much, Too Little, or Too Bad?" The Journal of School Health 42 (December 1972):592-596.

23. Owen, George M.; Kram, Kathryn M.; Garry, Phillip J.; Lowe, Jay E.; and Lubin, A. Harold. "Study of Nutritional Status of Preschool Children in the United States, 1968-70." Pediatrics 53 (Part II) (April 1974):597-646.
24. Pearson, Paul B. "Nutritional Perspectives in the Seventies." Nutrition Reviews 30 (February 1972): 31-34.
25. Prothro, Johnnie; Mickles, Mary; and Tolbert, Bernadine. "Nutritional Status of a Population Sample in Macon County, Alabama." American Journal of Clinical Nutrition 29 (January 1976):94-104.
26. Schneider, Howard A., and Helsa, J. Timothy. "The Way It Is." Nutrition Reviews 31 (August 1973):233-237.
27. Smith, Richmond W., Jr., and Frame, Bob. "Concurrent Axial and Appendicular Osteoporosis: Its Relation to Calcium Consumption." New England Journal of Medicine 273 (July 8, 1965):73-78.
28. Texas Woman's University Nutrition Research. Denton, Texas. Research data, 1975. (Typewritten.)
29. Todhunter, E. Neige. "Approaches to Nutrition Education." Journal of Nutrition Education 1 (Summer 1969):8-9.
30. U.S. Department of Health, Education, and Welfare. Public Health Service, Health Resources Administration. Preliminary Findings of the First Health and Nutrition Examination Survey, United States, 1971-1972: Dietary Intake and Biochemical Findings. DHEW Publication No. (HRA) 74-1219-1, 1974.
31. White House Conference on Food, Nutrition and Health. By Jean Mayer, Chairman. Washington, D.C.: Government Printing Office, 1970.
32. Whitehead, Floy Eugenia. "How Nutrition Education can affect Adolescent Food Choices." Journal of the American Dietetic Association 37 (October 1960): 348-356.