

DIET AND PERFORMANCE
IN HIGH SCHOOL ATHLETICS

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CHAPTER I

INTRODUCTION

Whenever coaches gather professionally at clinics, workshops, and athletic contests, the topics of discussion do not always revolve around coaching techniques¹ alone. The topics of their discussions vary because in many cases the coach also has the duties² of a teacher and physical educator, and of the trainer and guidance director for the athletic team under his supervision. Due to these many duties, the coach at times is just as wont to talk about training and diet problems as about split T's and the changing defenses. As the writer is now employed in the coaching field³ it is evident to him that trainers and coaches want more information regarding the diet of the athlete.

Statement of Problem

"We are what we eat,"⁴ is an expression used at times by some in the athletic field. The high school athletic coach should be very concerned about the meaning, the implication, and the truthfulness or falsehood of this statement as it effects his athletic program and the athletes therein. O'Donnell and Krehl⁵ related the fact that food was essential to

¹Coaching techniques are defined in this study as variations from, and uses of, offensive and defensive play.

²Baer, Roger, "Common Problems In Physical Education Classes," Scholastic Coach 24:50, April, 1955.

³The writer is employed as an Assistant Coach at Spearfish Junior-Senior High School, Spearfish, South Dakota.

⁴Interview with Gene Smith, former member of The Minneapolis Lakers Professional Basketball Team, January, 1956.

⁵O'Donnell, E. D., and Krehl, W. A., "Diet and the Athlete," Scholastic Coach 24:36, September, 1954.

the body for such things as heat, energy, growth, and repair of the cells. From this fact man may have reason to believe that the amount and kind of food he eats somehow influences his general well-being. A primitive concept⁶ about the values of food, led naturally to the idea that eating special foods provided extra strength or some other advantage to certain parts of the body.

— With all the scientific advancements concerning the nutritional value of food, it is now known that these ideas about certain foods giving advantages to the body are essentially false and that the growth, development, well-being, and function of the body depend not on any specific food substance, but on a well-balanced diet⁷ which provides all the essentials such as carbohydrates, fats, proteins, vitamins, minerals, and water which are needed by the body. —

Among the more common problems of the coach-trainer is, "What diet is recommended for the athlete, so as to enable him to perform to the best of his ability during the contest?" As the writer continues work in the coaching field it appears to him as though fellow coaches and trainers would like more information available to them in the area of the diet of athletes.

Purposes of Study

The writer is of the opinion that there is a need in the coaching field for further investigation into the problem of the relationship of diet and performance in athletics. The major objective during this investigation

⁶Ibid., p. 36.

⁷Ibid., p. 66.

is that of presenting the idea of a well-balanced diet in preference to diets of special foods, which would lead to generally higher performance in athletics. The opinion of Olympic winners, as shown by Stackhouse,⁸ is that special foods do not enable the athlete to perform better than if he eats a well-balanced diet of the foods he is used to in his day to day diet. The purpose is to show that this is generally true through an examination of studies concerning diet and performance in athletics. 2.5

Previous Studies in Field

The Supervisor of Athletic Conditioning, Edward D. O'Donnell, Yale University and Dr. William A. Krehl, Associate Professor of Nutrition, Yale Medical School, made a study in the area of nutritional requirements of the athlete. Conclusions were drawn and recommendations made as to the kinds of food to eat and time to eat before an athletic contest. These conclusions were that the athlete should eat foods that provided the energy needed for athletics at a time when the foods would be digested so as to have the energy available to the body when it was needed for athletic activity. Recommendations as to specific foods and times to eat were printed in September,⁹ 1954 and in November,¹⁰ 1954.

A survey¹¹ of the eating habits of the athletes competing in the world Olympic events has been made. Chester R. Stackhouse reported on the eating

⁸Stackhouse, C. R., "Eating Habits of World Olympic Athletes," Athletic Journal 34:20, March, 1954.

⁹O'Donnell, op. cit., p. 36.

¹⁰O'Donnell, E. D., and Krehl, W. A., "Ideal Meals for the Athlete," Scholastic Coach 24:48, November, 1954.

¹¹Stackhouse, op. cit., p. 20, 60-63.

habits of Olympic track and field winners from around the world. The report of this survey gives actual word-for-word quotations from forty-three of the point winners of the 1952 Olympic Games, held in Helsinki, Finland, regarding what foods were actually eaten by the athlete during training for the Olympic Games. The report gives an interesting picture of the variations in the diet of Olympic athletes from different parts of the world. The general conclusions reached from this survey were that the variations of foods eaten; and the differences in overall eating habits caused by individual country customs as shown by athletes from countries competing in the Olympic Games, had little or no effect on superior performance in athletics. —

Montoye and Hunsicker¹² refer to the November, 1952 issue of *Research Guide* to relate a study made by the Sports College of Toronto, Canada. The Sports College found that virtually all athletes were overweight for top efficiency. Baseball players averaged fourteen pounds overweight. Other over-weight averages were: Swimmers, twelve pounds; tennis players, nine pounds; and football players, eight pounds. The Sports College pointed out that the human race seemed to be getting bigger, and that this eating more and getting bigger resulted in declining athletic efficiency of the body. —

The studies and works of O'Donnell and Krehl, Stockhouse and the Sports College, regarding the eating habits of athletes, are further substantiated by Montoye and Hunsicker,¹³ Doller,¹⁴ Johnson,¹⁵ Steton,¹⁶

¹²Montoye, H. J., and Hunsicker, P. A., "B₁₂ In Athletics," Athletic Journal 35:53-54, March, 1955.

¹³Ibid., p. 53-54.

¹⁴Doller, J., "Food For Thought," Athletic Journal 35:36, September, 1954.

¹⁵Johnson, W. R., "How Good Are Pre-Competition Super-Foods," Athletic Journal 33:14, February, 1953.

¹⁶Steton, W. M., "Vitamin Nutrition for Schoolboy Athletes," Scholastic Coach 21:52, September, 1951.

Harmon and Johnson,¹⁷ and Upjohn.¹⁸ These previous studies concern primarily the athlete in college or beyond college age but they all point to a general relationship between diet and performance in athletics. The writer felt that a study of this nature was needed as it would concern the high school athlete or the boy who needed to eat to fulfill growth requirements in addition to the athletic requirement in order to meet best performance standards. The method of approach to the problem is given in the following section.

Procedures

The procedures used in carrying out this study were in general as follows. First, interviews were held with various nutrition experts, coaches, and trainers so as to become acquainted with theories, pertaining to the diet of athletes, which may later lead to problems for the coach. From these interviews a general picture of the theories and actual practices, with regard to diet and athletic performance, was formulated. With a picture of the theories and the actual practices formulated, the second step in the procedure was to review literature in the field which concerned the nutritional requirements of the body of teen-age athletes.

The writer reviewed literature concerning well-balanced diets in general as a third step in the procedure. From the theories pertaining to diets of athletes, and from literature regarding actual nutritional requirements of the body and well-balanced diets, the writer continued the study with the idea that, in general, a well-balanced diet leads to greater athletic

¹⁷Harmon, J. M., and Johnson, W. R., "Emotional Reactions of College Athletes," Research Quarterly 23:391-397, December, 1952.

¹⁸Upjohn, H. L., and others, "Feeding the Athlete," Scholastic Coach 23:36, September, 1953.

performance than does a diet of any special foods. ✓

Some of the theories concerning the diet of the athlete, as well as diet characteristics of teenagers in general and characteristics of a well-nourished person, are reviewed in Chapter II, The Athlete and The Training Table.

CHAPTER II

THE ATHLETE AND THE TRAINING TABLE

Coaches have handed down, one to another, ideas concerning the diet of the athletes. These ideas have included theories such as athletes should not eat spices; certain foods should not be eaten before a game; do not eat less than three or four hours before a game; feeding dextrose or simple sugars gives extra energy; carbohydrates and fats should be excluded from the diet; milk should not be consumed the day of a game; water may be harmful during activity; and food has no bearing on skin trouble among teenagers. All of these theories or ideas are generally concerned with the coach, athlete, diet of the athlete, and performance of the athlete.

Many of these ideas or theories conflict, some have no bases for theory, and others may sound logical or even true. Unfortunately, however, many of these theories are still influencing the athlete's diet, so that his diet is frequently designed around some of them. A few of the more important of these prevailing theories of diet will be presented.

Theories Influencing The Athlete's Diet

Most of the ideas concerning diet center around the ideas of the effect of spicy foods, pre-game foods, time of eating, and water usage by the athlete, even though these ideas may vary from time to time and from area to area. Each of these are treated separately in the following sections.

Spices. The effect on the body of highly spiced foods such as catsup, is one theory influencing the training table. It is known that catsup is

made from the highly nutritious tomato.¹ It is also known that spices such as cloves, ginger, and sage, when eaten in large quantities, do take their toll on the digestive system as brought out by Sidwell.² From this information conclusions have been drawn as to their place in the diet of the athlete so as to enable the athlete greater performance ability.

Pre-game foods. A second general idea handed down from coach to coach is that certain foods such as lean meat, toast and honey are recommended for consumption prior to a game while others such as pork, bread, milk, and corn are to be avoided. Proper placement of each food into one of these categories constitutes an important problem for the coach. Should boys eat poached eggs or a thick steak before a game? Some in the coaching field³ tell us it will be least upsetting to the system if the boy eats what he is most used to. The question then asked by the coach is, "Will these foods the athlete is used to be the best for him?"

Time of eating. Another idea which often arises is determining the best time to eat, both preceding and following participation in an active sport. One high school student can eat a heavy meal and be playing a game within an hour with no apparent ill effects, while another may find his digestion at that time so incomplete, the activity may result in illness. This is clearly evidenced by O'Donnell and Krehl.⁴ The same may be true

¹"Homemade Catsup," Successful Farming 51:52-53, No. 8, August, 1953.

²Sidwell, V. D., "How To Use Spices", Country Gentlemen 124:111, No. 9, September, 1954.

³Interviews with Dr. W. C. Goodell, Coach and Trainer, South Dakota School of Mines, Rapid City, South Dakota, and Mr. Clifford Papik, Athletic Director, Black Hills Teachers College, Spearfish, South Dakota.

⁴O'Donnell, E. D., and Krehl, W. A., "Ideal Meals for the Athlete," Scholastic Coach 24:48, November, 1954.

following a competitive sport which would leave one very tense, upset and unable to eat while another fellow would be ravishingly hungry and be able to consume immeasurable amounts successfully.

Dextrose. The practice of feeding ~~dextrose~~ or quick energy foods has added to the problem of feeding the athlete. Marathon runners are often fed quick energy foods during a race and seem to receive the needed surge of energy, but does this rapid changing of energy supply have any harmful effects on the body, and does this merit giving these foods during an activity, or are there no effects, harmful or helpful resulting from feeding dextrose?

Carbohydrates and fats. How much carbohydrate and fat should the athlete have in his diet? Here again is found a great difference of opinion as revealed by a survey.⁵ It seems to be general practice for coaches to forbid completely or almost completely the use of sweets. There are no bases for this physiologically⁶ so long as the sweets are consumed at an appropriate time so as to allow their digestion and assimilation in the body.

Milk. Most growing boys and girls like to include some milk in their daily diet. The coach may be confronted with a problem of gastric difficulties when considering milk in the diet of the athlete. This has been shown by O'Donnell and Krehl in their statement:

The question of when milk should be consumed represents a source of considerable disagreement among coaches. Most coaches forbid the consumption of milk during the noon meal on the assumption that it contributes to gastric difficulties later on in the afternoon when the athlete goes into action.⁷ 8 46

⁵O'Donnell, E. D., and Krehl, W. A., "Diet and the Athlete," Scholastic Coach 24:66, September, 1954.

⁶Ibid., p. 66.

⁷Ibid., p. 66.

Water. There are conflicting theories on water drinking just before and during a vigorous activity.⁸ Some long-time coaches⁹ in the field relate that some boxers and wrestlers did not drink any liquids for some time before a fight because they were trying to lose enough poundage to put them in a lighter weight field. Often the one who had dehydrated his system happened to win the bout. Due to this, the theory then developed that dehydration of the tissues was not harmful but perhaps even helpful. They neglected to reason that perhaps improved training or experience in the heavier weight field had significantly contributed to the boxer or wrestlers victory.

It is now commonly theorized by some¹⁰ that the water loss of the tissues by perspiration during vigorous activity must be replenished in order that the body tissues can maintain the proper acid-alkaline balance for optimum health. It is generally accepted by coaches that water consumption must be made with discretion to prevent shock to the system. For example, drinking ice water when the system is hot or exercising vigorously with large quantities of water in the stomach might cause an upset stomach or cramps.

Skin problems. Teenagers are often times afflicted with serious skin problems such as acne, blackheads, and pimples. If these are results of improper diet, it is the concern of the athletic director in that the student cannot give his utmost to the game when he is self-conscious or uncomfortable

⁸Based on answers from 13 Western South Dakota High School Coaches, relative to the question, "Do you allow the drinking of water before or during games and for what reasons?"

⁹Related by Mr. William A. Mitchell, Basketball Coach, Rapid City High School, Rapid City, South Dakota.

¹⁰Interviews with Dr. W. C. Goodell, Coach and Trainer, South Dakota School of Mines, Rapid City, South Dakota, and Mr. Clifford Papik, Athletic Director, Black Hills Teachers College, Spearfish, South Dakota.

about his complexion. Foods that contribute to skin problems are generally different for each individual athlete and they should be noted or even memorized by every high school coach.

Other ideas which may be present and that may result as problems to coaches are: Pork is undesirable as a food for athletes; pie and cake are harmful; all fat must be trimmed from meat; and only a limited amount of butter be served on the training table.

A coach, well informed in nutrition, should be able to make wise decisions concerning the diet and eating habits of those in his charge. There are also certain teen-age characteristics which may be related to the nutritional habits of young people. These will be discussed in more detail in the following section.

Diet and Teen-Age Characteristics

During adolescence the body needs optimal amounts of nutrients to insure proper maturation for fulfillment of adulthood responsibilities, as well as for fulfillment of present activity desires. Physical growth is continuing for most boys throughout their high school days. Boys reach optimal height growth usually about sixteen¹¹ years of age, but dentition may not be completed until after the teen age¹² has passed. The muscular growth continues for teen age athletes all during this age, starting with

¹¹Rand, W.; Sweeny, M. E.; and Vincent, E. L., Growth and Development of the Young Child, 4th Edition, W. B. Saunders Company, Philadelphia, 1946, p. 6.

¹²Teen age is defined in this study as the age between 13 and 19 inclusive.

what is often called the awkward age¹³ and continuing into improved coordination as the muscles become firm and possess tone. With strengthened muscles, posture should improve for the teen-ager.

Organic development is progressing rapidly as the puberty cycle¹⁴ is completed in the teen-ager. These glandular instabilities during the puberty cycle may result in fluctuations in the energy level, which in turn would result in headache, nosebleed, nervousness, palpitations, and acne, as are clearly brought out by Rand, Sweeny, and Vincent.¹⁵ Another point to be noted at this time is the larger number of cases¹⁶ of susceptibility to active tuberculosis in the teen-age group. Tuberculosis usually attacks only those in a rundown, low-resistant condition and it is felt by the writer that diet at this time often contributes greatly to this rundown, low-resistant system of the teen-ager.

Those who work with young people should be aware of the many things which characterize the teen-ager. A young person is often an emotional, know-it-all, who lacks experience and who resents information given to him by an adult, whether it be dietary or otherwise. He desires to be one of the gang and a conformer to the group. An example here may be: If one follows a poor diet or has poor eating habits, all of them in that particular teen-age group will follow the same habits.

¹³Awkward age is defined as that time during body development when muscular growth and coordination do not coincide.

¹⁴Puberty cycle is considered as the period of development of secondary sex characteristics.

¹⁵Rand, op. cit., p. 66.

¹⁶Curtis, F. D.; Caldwell, O. W.; and Sherman, N. H., Everyday Biology, Ginn and Company, New York, 1946, p. 498.

The young person finds his physical ability very important to him and he generally has an enormous appetite. These two factors aid the athletic coach if he is educated in nutritional requirements and if he directs the fellows in proper eating habits. The athletes are often self-conscious and because of this, the coach must exercise caution in directing these teenagers. Young people are quite often breakfast-skippers because they eat too heavily just before retiring. That late evening lunch seemed a necessity because of this huge appetite, but by skipping breakfast the next day, the athlete gets a mid-morning lag. Marks may drop, the attitude may be undesirable, and interest may lag. This teen-age is the age of greatest competitive spirit and the young person does not realize fatigue or other body limitations. It is up to the coach then, to recognize these body limitations and to guide the athletes in proper eating habits for best results in the athletic program, no matter what his ultimate goal in coaching may be.

Teen-agers may develop poor eating habits. It is usually a question of too little, too much or unbalanced diets. If it is a problem of too little the causes may be varied, such as insufficient funds to supply the needs, poor appetite, fussy or "picky"¹⁷ eaters, or allergies. If it is a problem of too much, it is usually due to habit which developed an enormous appetite. Unbalanced diets result from such things as allergies, lack of knowledge of the actual nutritional requirements of the body, unavailability of proper foods, "picky" appetites, eating "junk"¹⁸ and eating excessive fillers such as potatoes and bread, which tend to crowd out of the diet

¹⁷Picky is defined as one who selects only a few varieties of foods.

¹⁸Junk is defined as foods of very low calorie composition.

other essential foods. The results of these poor eating habits will be more fully explained in the discussion of nutritional requirements for the body.

Athletes also have the problem of irregularity of meals. This is caused by forces usually beyond the athletes control, but nevertheless, poor eating habits, poor body growth, development, health, and decreased body activity such as slower reactions, lowered endurance and ability may result from irregularity of meals. Some of the causes of irregularity of meals are out-of-town trips, tournament schedules, practice times, and irregularities in the athletes own family's schedule. Even tiny babies kick up a fuss when they can't eat on schedule and the teen-age system may react much the same.

Characteristics a coach would like to see in an athlete often parallel those of any well-nourished person. Some of these characteristics a coach would probably like to see in an athlete are discussed in the next section, which deals with the well-nourished person.

Characteristics of a Well-Nourished Person

There are many indications¹⁹ which characterize or enables one to judge a well-nourished person. In a well-nourished person, a coach would recognize such signs as smooth, lustrous hair; bright, clear eyes with no dark circles under them; and a clear, smooth, slightly moist skin, free from excessive oils or dryness. The mucus membranes of the mouth and nose would be pink and moist. The fatty tissues of the body would be firm, properly placed, and not in an excessive amount as to cause an overweight look.

¹⁹Ourtis, op. cit., p. 510.

A healthy athlete's muscles are well developed and have good tone.²⁰ The athlete is well coordinated because his muscle growth has paralleled his bone growth.²¹ The skeletal growth has progressed properly resulting in straight, strong, long bones; no enlarged joints; a chest that is broad and deep; a pelvic arch that is of optimal measurement and a skull and jaw development that is well shaped with well formed, straight, sound teeth.²² The posture of the well-nourished person should be straight with head erect, chest out, abdomen in and the feet parallel. The well-nourished person has normal body functioning with no scars of past diseases.²³ The well-nourished athlete is easily relaxed and possesses self-confidence in his actions.²⁴

The food eaten, therefore, must influence to a considerable degree, perhaps even more that it is realized, the responses to emotional factors. This in turn must surely have an effect on the nutritional requirements of the body. In the coaching field coaches and trainers have come up with the term Vitamin L.²⁵ In this term there is more truth than fiction. The writer feels that every child should sit down to a meal with a good and happy attitude. The meal will not only be more beneficial to him but his appetite will also improve. The writer feels that it is very important for coaches to know that emotion can influence digestion greatly.

If the athlete is to be helped by the coach to gain the characteristics

²⁰Curtis, op. cit., p. 510.

²¹Curtis, op. cit., p. 510.

²²Curtis, op. cit., p. 510.

²³Curtis, op. cit., p. 510.

²⁴Curtis, op. cit., p. 510.

²⁵Vitamin L is the term used in the coaching field meaning love and affection.

of a well-nourished person, it appears to the writer that a knowledge of the nutritional requirements of the athlete's body is necessary.

The nutritional requirements of the athlete's body so as to fulfill growth and activity needs, will be discussed in Chapter III.

CHAPTER III

NUTRITIONAL REQUIREMENTS

Several basic facts must be known when considering the nutritional needs of an athlete. The first is that one cannot become a "superman" by merely eating food.¹ Food cannot endow a person with capacities beyond those inherent in his physiological structure.

The second factor to consider is that man is essentially the product of his heredity and environment.² Again, food alone cannot make a little man big or improve the sight, hearing, or reflexes of an individual who is naturally deficient in one or more of these respects.

The third factor of which the least is known about, is that of emotional influence on the development and behavior of the individual. The emotional factor³ has an important bearing upon how the food eaten is handled and how the person reacts to the circumstances in which he is sometimes placed during athletic competition.

Food racketeers pry on the public with fancy terms such as "diet delight," "heart's delight," "miracle pain reliever," and "mouth-watering flavor," which may tend to sell questionable products. It is up to the athletic coach to know and recognize the general classifications of food and the organic nutrients therein contained. The coach-trainer should know what the body requirements are, and how much of each requirement is necessary,

¹O'Donnell, E. D., and Krehl, W. A., "Diet and the Athlete," Scholastic Coach 24:36, September, 1954.

²Ibid., p. 36.

³Ibid., p. 36.

so that he may plan a nutrition program for the athlete to follow every day. He must know these factors to guard against misuse but he must also know classification of foods for values.

Classifications of Energy Foods

Foods may be classified into the general classes of energy yielding and non-energy yielding foods.⁴ Foods are further classified as those essential to life and those not essential to life.⁵ All energy foods are essential to life and include the foods normally called carbohydrates, fats, and proteins.⁶ The non-energy, essential foods include water, vitamins, and mineral salts.⁷ The non-energy, non-essential foods would include such foods as food flavors, condiments, and stimulants.⁸

From these general classifications of foods one can see that the foods the coach, athlete, and any boy or girl should be primarily interested in are the carbohydrates, fats, proteins, and the organic nutrients (vitamins, water, and mineral salts) because they are essential to the body for growth development, repair and general well being. The stress of the importance of these essentials is so common among medical, biological, and other authorities that a detailed presentation is given as a guide.

⁴Curtis, F. D.; Caldwell, O. W.; and Sherman, M. H., Everyday Biology, Ginn and Company, New York, 1946, p. 314.

⁵Ibid., p. 314.

⁶Ibid., p. 314.

⁷Ibid., p. 314.

⁸Ibid., p. 314.

Carbohydrates. Nutrition for maximum efficiency of the body is provided by carbohydrates,⁹ therefore, the following generalities should be kept in mind. First, the problem of the number of calories¹⁰ needed must be given prime consideration. Secondly, remember as a coach a person is dealing with an individual in one of the most important phases of his growth, that is during the middle to late teens when the athlete is rounding out and beginning to attain maturity.

The main functions of carbohydrates are to provide energy and some heat for the body and its processes. The determination of the caloric requirement depends on the following:

1. Relation between amount of oxygen used and calories burned or heat production by the body.¹¹
2. Basal metabolism rate.¹² The basal metabolism test is taken when the patient is at complete rest but not sleeping, at a comfortable temperature, and twelve hours after the last meal. This is a test which shows the number of calories used to supply energy for internal work of the body. These caloric requirements vary due to age, sex, temperature, kind of food eaten, amount of exercise, and proportion of nonfat weight of body.¹³

The writer feels that mental work may use calories nearly equal to

⁹Ibid., p. 319.

¹⁰Calorie is defined as the amount of heat used in raising the temperature of one kilogram of water one degree centigrade.

¹¹Proudfit, F. T., and Robinson, C. H., Nutrition and Diet Therapy, 9th Edition, Macmillan Company, New York, 1946, p. 37.

¹²Ibid., p. 39.

¹³Ibid., p. 39-40.

physical work because of the greater nervous strain involved. Disturbed sleep may often be a result of this mental work, appetite may often be reduced and digestion may also be disturbed and incomplete.

The energy allowances for children are necessarily higher per pound of body weight than those of adults. The writer believes this is true because growth and development during the period from birth to maturity make for greater demands for energy than does the maintenance of the already complete body structure of the adult. Different periods of growth likewise may differ in the demand for energy. Children even of the same age, height, and weight may differ widely in the energy needs, depending largely upon their degree of activity. The writer feels that if the growing athlete does not meet the energy requirement needs for growth as well as activity the development and growth of the individual may be at a standstill. This standstill is something coaches should be concerned about if they consider health as part of athletics. If the athlete's body is not getting enough food for both, but all the energy is being used for growth the writer feels the energy needs for activity would show up by the degree of activity by the athlete. The energy requirements for the activity of the athlete along with requirements for growth and development should be of primary importance to the coach.

Table I represents the calories needed per kilogram of body weight for one hour of activity in a few athletic activities. The calories needed, as shown in Table I, are exclusive of calorie needs for basal metabolism and influence of food.

TABLE I. CALORIES PER KILOGRAM
OF BODY WEIGHT PER HOUR OF ACTIVITY*

<u>Activity</u>	<u>Calories Per Kilogram of Body Weight Per Hour</u>
Bicycling (moderate speed)	2.5
Boxing	11.4
Dancing, waltz	3.0
Exercise	
Very light	0.9
Light	1.4
Moderate	3.1
Severe	5.4
Very severe	7.6
Fencing	7.3
Ping pong	4.4
Rowing in race	16.0
Running	7.0
Skating	3.5
Swimming (2 mi. per hr.)	7.9
Walking (4 mi. per hr.)	3.4

*Macleod, G., and Taylor, C. M., Rose's Foundations of Nutrition, 4th Edition, Revised, Macmillan Company, New York, 1944, p. 58.

From a study of Table I it is noticed that the energy needs of the body are high when the athlete participates in a more strenuous activity such as boxing or rowing in a race.

Experiments and tests have been carried on by Rose with the conclusions reviewed by Macleod and Taylor¹⁴ so as to show the percent increase of calorie needs over the basal metabolism that some of the different activities cause. These are shown in Table II.

¹⁴Macleod, G., and Taylor, C. M., Rose's Foundations of Nutrition, 4th Edition, Revised, Macmillan Company, New York, 1944, p. 70.

TABLE II. PER CENT INCREASE OVER BASAL METABOLISM IN
DIFFERENT ACTIVITIES*

<u>Activity</u>	<u>Per Cent Increase Over Basal</u>
Piano practice	56
Standing	80
Cricket	259
Gymnastics	298
Dancing	547
Swimming	669
Football	762

*Macleod, G., and Taylor, C. M., Rose's Foundations of Nutrition, 4th Edition, Revised, Macmillan Company, New York, 1944, p. 70.

Table II gives a picture of the percent increase over basal metabolism needs of the body when some activities are participated in. It is noticed that there is a high percentage increase in calorie needs during participation in swimming and football.

Calories do not spell the whole story as they could all be obtained from one food, but the person would have an unbalanced diet in eating only one food. Calories must be gotten in proper proportion from all three general groups, carbohydrates, fats, and proteins. For example: A boy fond of meat could get enough calories from it if he ate enough, but he doesn't need all that protein and he would lack heat because no fuel-giving foods were eaten. Or, he may eat lots of ice cream and get plenty of calories but would find fat piling up to make him overweight.

Fats. Varied uses¹⁵ are made of fats in the diet. These varied uses may be that it increases the absorption of calcium which has an effect

¹⁵Proudfit, op. cit., p. 29-30.

on bones and teeth. The foremost purpose is to produce heat and energy.¹⁶ Too much fat may effect the carbohydrates and may cause less sugar to be burned and the more fat that is eaten the less thiamin needed by the body. Fat may serve as spare proteins in time of protein need such as illness or accident. Fats final value or use may be that it is used as a body lubricant.

If a person doesn't maintain the proper fat intake the most significant results¹⁷ may be constipation and its complications, digestive disturbances such as constant hunger pains, and either overweight or underweight depending on the individual. Excessive amounts¹⁸ may result in overweight, flabby fat, oily skin and hair, usually pimples and acne, lassitude, and lowered mental alertness.

From the purposes and uses of fat in the body the writer feels it is very evident that fat intake is important to the athlete as it may have some effect on his performance in competition.

The sources of fats generally fall into two groups.¹⁹ These groups being animal and plant. The sources of fat are readily classified into one of the groups. These groups along with sources of fat for each group are shown in Table III.

¹⁶Proudfit, op. cit., p. 29-30.

¹⁷Proudfit, op. cit., p. 29-30.

¹⁸Proudfit, op. cit., p. 29-30.

¹⁹Proudfit, op. cit., p. 31.

TABLE III. SOURCES OF FATS²

<u>Animal</u>		<u>Plant</u>	
Bacon	Cod liver oil	Nuts	Coconuts
Butter	Fat fish	Chocolate	
Cheese	Fat meats	Vegetable oils	
Cream	Lard	Peanut butter	
Egg yolk		Olives	

²Proudfit, F. T., and Robinson, C. H., Nutrition and Diet Therapy, 9th Edition, Macmillan Company, New York, 1940, p. 31-32.

In Table III it is noticed that there are fats which are solids and fats which are liquids in each group. From this selection an athlete should be able to select ample fat foods for body needs.

Protein. Proteins are made up of amino acids of which twenty-two²⁰ are known to be in existence. Of these twenty-two there are ten²¹ particular ones which are essential to body growth, health and development. Foods which contain all ten of these essential amino acids are known as complete proteins. They are found in all meats and amino products. Those proteins which contain only some of the ten essential amino acids are called incomplete proteins and are found in such foods as gelatin, peas, beans, leeks and lentiles.

The main function of proteins is to build and repair body tissues.²² Other functions are:

1. Produce hemoglobin in the blood

²⁰Proudfit, op. cit., p. 10.

²¹Proudfit, op. cit., p. 11.

²²Proudfit, op. cit., p. 18.

2. Produce hormones from glands
3. Produce enzymes
4. Responsible for production of urine and proper removal of wastes
5. Keeps proper acid-alkaline balance in body fluids
6. Needed to form antibodies
7. Needed for clotting blood

Some energy may be produced but the body does not depend on protein as a source of energy because other foods such as fats and carbohydrates are more efficient.

A protein deficiency appearance²³ may result in pale colored blood, lack of muscle tone, low blood pressure, fatigue, low resistance to disease and infections, stunting of growth and the body may retain liquid which may cause edema.²⁴

The effects of inadequate protein in the diet as given in this study are as follows:

1. Depleats protein storage supply
2. Tears down body muscles
3. Fails to produce enzymes and hormones in the body
4. Tends to slow up healing after surgery
5. Leaves scar tissues weak
6. Loss of nitrogen in the urine due to body tissue destruction without immediate repair.

²³Proudfit, op. cit., p. 18.

²⁴Edema as used in this study is the morbid accumulation of body fluids.

The effects of high protein in the diet are given in this study as follows:

1. Health is better generally
2. Excess passed off as waste products
3. Activity more easily performed
4. Fatigue recovery more rapid

The average protein intake is ten to fifteen percent²⁵ of the total calories of the diet. Most athletes and people doing greater physical labor eat large amounts of food and thus more protein. Protein is most essential for high school athletes because they are still growing.

The theory that high protein in the diet could cause kidney diseases has been disproved. An Arctic explorer, Stefansson and his assistant, lived a year on meat alone and they returned in perfect health with no ill effects. A vegetarian must plan his diet carefully, using wheat, soybeans, cottonseeds, peanuts, and nuts, or he may become an unhealthy vegetarian.

The amounts of protein needed per day may depend upon age, rate of growth, condition of growth, and activity to a certain extent. Boys in age group thirteen through fifteen need eighty-five grams per day and boys sixteen through twenty need one-hundred grams per day.²⁶ Protein may not be stored in the body over any length of time, therefore, this requirement needs to be filled every day.

The writer feels that protein may be altered by heat, therefore, a person should learn to eat meats rare, bread untoasted, and vegetables not

²⁵O'Donnell, op. cit., p. 38.

²⁶Proudfit, op. cit., p. 19.

over-cooked. If protein is of animal source, lengthy heat application may produce toughness.

Proteins rarely occur alone in nature, however, food faddists used to believe one should never eat protein and carbohydrates together. From the fact that foods rarely contain either protein, carbohydrates or fats alone, this has no basis for belief. During diseases with fever particularly, protein may be drawn from the body's own tissues. The drawing being from the least important muscles first.

The foregoing section has generally been concerned with the needs for energy producing foods in the body. The essential non-energy foods will be discussed in the following section.

Non-Energy Foods

Vitamins and minerals²⁷ are the names given to groups of organic substances other than carbohydrates, fats, and proteins which are absolutely essential for the maintenance of growth and health in all ages. The vitamins are potent, organic compounds which occur in minute quantities in foods and are essential for some specific body functions.²⁸ Vitamins are classed as water solubles and fat solubles,²⁹ with wide divergency between the various members of each group.

Vitamin A. The first of these nutrients to be considered will be

²⁷Curtis, op. cit., p. 314.

²⁸Proudfit, F. T., and Robinson, C. H., Nutrition and Diet Therapy, 10th Edition, Macmillan Company, New York, 1950, p. 99.

²⁹Ibid., p. 99.

Vitamin A. Human beings have two distinct visions.³⁰ Day vision is what is seen by the light of sun rays and its reflections. Night vision depends entirely upon our Vitamin A reaction.³¹ If a person lacks Vitamin A, night vision is effected immediately because this type of vision depends on a substance known as visual purple.³² It is made of protein and Vitamin A.³³ Light destroys visual purple and the product of this destruction sets up nerve impulses which tell the brain what is seen. Visual purple then again must be formed for further sight to take place.³⁴ This lack of night vision is called night blindness³⁵ in its mild form.

The time of recovery from bright light to darkness (as an afternoon movie) indicates to the individual the amount of Vitamin A present in his system. Other eye symptoms of Vitamin A deficiency³⁶ are eye fatigue, sight slows down, nervousness, headaches, exhaustion, eye strain and burning or itching lids. Another self indication would be a yellowish cast to the thin-skinned area of the body like the palm of the hand.

There seem to be no facts that prove excessive amounts of Vitamin A are helpful or harmful to the body. Because it is a fat soluble vitamin, it is known to be stored in the body, especially the liver,³⁷ for future

³⁰Ibid., p. 101.

³¹Ibid., p. 102.

³²Ibid., p. 102.

³³Ibid., p. 102.

³⁴Ibid., p. 102.

³⁵Ibid., p. 103.

³⁶Ibid., p. 102-104.

³⁷Ibid., p. 101.

use in time of need. If the parts of the body require more Vitamin A than is included in the daily diet, the stored supply is made available.

Only animal foods contain Vitamin A³⁸ as such, with fish liver oils being an outstanding example. Milk, butter, fortified margarine, egg yolk, cheese, and liver being other sources of Vitamin A.

From these characteristics of Vitamin A it is noticed that the lack of Vitamin A may effect athletes in the following ways: Twilight games may be very poorly played; night games may produce more eye strain; greater sensations develop to bright light; and bright light given off in the winter time may cause undue fatigue on athletes from studies and games.

In summary the writer feels it could be said that a person should eat plenty of Vitamin A for beauty of the hair, skin, eyes, and for endurance of good health and freedom from eye fatigue and infections.

Vitamin B Complex. The grouping of at least fifteen³⁹ related vitamins is called B Complex. Some of these B Complex vitamins are discussed in the following paragraphs.

Riboflavin was first named Vitamin G but has since been found to be one of the B Complex vitamins and is termed B₂.⁴⁰ The main function of it is to help cure the disease pellegra,⁴¹ however, its use alone will not prevent this disease. One who does not have a sufficient supply of this vitamin lacks pep, endurance and suffers fatigue because this vitamin aids in burning

³⁸Ibid., p. 104.

³⁹Ibid., p. 120.

⁴⁰Ibid., p. 126.

⁴¹Ibid., p. 129.

sugar for energy through enzyme formation.⁴² From these characteristics, it may be noticed that a lack of riboflavin would affect the performance of an athlete.

Riboflavin in the diet has a definite effect on the skin.⁴³ Facial oil glands become over active without it; the lips are red, cracked and sore; the corners of the mouth and eyes are cracked and swollen and scabs may form on the lips and the base of the nose.⁴⁴ It can readily be seen that any of these symptoms may hinder the athlete psychologically and emotionally if he was performing before an audience.

This particular vitamin is found in milk, eggs, liver and yeast as the richest sources.⁴⁵ Other sources include green leaves of beets, carrots, broccoli, kale, mustard, spinach, water cress, cabbage and lettuce. It is lost in refining grains for cereals.⁴⁶ Vitamin B₂ is amply supplied if one quart of milk is consumed daily.⁴⁷

Another B vitamin which is closely connected with the disease pellegra is niacin. Pellegra⁴⁸ is the only vitamin deficiency disease which causes thousands of deaths in the United States each year. In 1930 there were 6,333 deaths and in 1938 there were over 3,000.⁴⁹

⁴²Ibid., p. 127-129.

⁴³Ibid., p. 129.

⁴⁴Ibid., p. 129.

⁴⁵Ibid., p. 130.

⁴⁶Ibid., p. 130.

⁴⁷Ibid., p. 130.

⁴⁸Davis, A., Vitality Through Planned Nutrition, Macmillan Company, New York, 1942, p. 182.

⁴⁹Ibid., p. 182.

Mild lack of niacin may not be severe enough to be termed pellegra but there are certain symptoms⁵⁰ which indicate this lack. The personality may change, as a courageous person may become cowardly. They may lack morale; have insomnia; indigestion; loss of appetite, weight and strength; may develop diarrhea; and the skin may become red and chapped, all of which may have some affect on the athlete.

The sources⁵¹ of niacin are yeast, liver, fish, fowl, peanuts, dried peas and beans, soybeans, milk, butter, and cheese. Other fruits and vegetables have some. The amount to be included in the daily diet is not certain but a good rule to follow may be to eat plenty of these foods each day.

Vitamin C. Ascorbic acid is the scientific term which may be used to designate Vitamin C. This vitamin's main function is to prevent scurvy. History has revealed some interesting events which brought to the light of the people the value of certain foods in the prevention of scurvy. One such incident involved the English navy. After a captain discovered these fruits kept his men free of this dread disease, a rule was passed ordering all ships to carry quantities of fresh limes when they put to sea. From this incident, the English sailors today are known as Limes. Other sailors found that sprouted onions kept them free of scurvy.

In 1932, Dr. King, of the University of Pittsburg, found that Vitamin C, or ascorbic acid, was necessary for the functioning of all cells and the burning of foodstuffs to produce energy.⁵²

⁵⁰Proudfit, op. cit., p. 132.

⁵¹Proudfit, op. cit., p. 133.

⁵²Davis, op. cit., p. 220.

Vitamin C has numerous functions. It cements all body cells together,⁵³ particularly the connective tissues and its lack will cause weakening of these tissues. It has much to do with tooth growth and development.⁵⁴ If Vitamin C is lacking, tooth enamel may be thin, the dentine may break down and become soft and porous, allowing decay to set in easily. In cases of severe tooth decay the tooth may die and be lost.

Bruises are important danger signals to coaches. If bruises occur, those cells supplied by the broken capillaries are not nourished and waste material is not removed from them.⁵⁵ Bacteria may attack where these dead cells are and may be transported through the blood system from one area to another. These hemorrhages or bruised areas may occur in any area of the body where pressure is applied if the walls of the vessels are not strengthened by sufficient amounts of Vitamin C in the diet. If wounds or broken bones occur, strong scar tissue must form and rapid healing must take place so as to restore the body to normal. This can take place only when sufficient amounts of this vitamin are supplied to the body.⁵⁶

The best sources of ascorbic acid, according to Proudfit,⁵⁷ are: Oranges, lemons, grapefruit, tangerines, parsley, tomatoes, strawberries, peppers, raw cabbage and green leafy vegetables as spinach, kale, brussels sprouts, beet and turnip tops. Large quantities of apples, bananas, pineapple, lettuce, potatoes and green beans and peas, give appreciable amounts

⁵³Proudfit, op. cit., p. 116.

⁵⁴Proudfit, op. cit., p. 116.

⁵⁵Ourtis, op. cit., p. 527.

⁵⁶Proudfit, op. cit., p. 116.

⁵⁷Proudfit, op. cit., p. 117-118.

even though they do not contain large amounts of the vitamin. The writer feels that getting the needed amount of Vitamin C is important in athletics, especially as it pertains to bruises.

Calcium. The mineral probably most important in the formation of tooth structure is calcium.⁵⁸ Ninety-nine⁵⁹ percent of the calcium deposit is in this body area, with the remaining one percent responsible for a variety of functions. This indicates a great necessity to the body for stature growth.

The lack of calcium⁶⁰ shows itself in many ways. The first signs may be rarified bones, poor tooth formation, soft tissues degenerate, and cramps or convulsions may result. In addition to these, the nerves may be effected, showing itself in tenseness, irritability, temper, poor sleep habits, high strung disposition and nervous habits. Calcium gives tonus to the muscles, including the regulating of the heart beat. The heart may beat too fast on a low calcium diet. If a prospective athlete or an athlete lacks muscle tone, it may be recognizable from the protruding stomach, head carried forward, rounded shoulders, bowed legs and poor posture in general.

Teenage boys often grow too fast for their diet and develop this poor muscle tone because all the calcium is going into the bones⁶¹ instead of proportionate amounts going to the soft muscles.

Calcium is extremely hard to get in diets if milk⁶² or milk products

⁵⁸Proudfit, op. cit., p. 77.

⁵⁹Proudfit, op. cit., p. 77.

⁶⁰Proudfit, op. cit., p. 81-82.

⁶¹Proudfit, op. cit., p. 81.

⁶²Proudfit, op. cit., p. 79.

are not included in the daily diet. Carrots, kale and almonds contain small amounts of calcium and it is absorbed well from these sources. To get the daily requirement the individual needs at least three⁶³ cups of milk per day.

Phosphorus: Phosphorus in the body is distributed in the proportions of approximately 90 percent⁶⁴ in the skeletal structure and the rest in the soft tissues. It gives rigidity to the bones and teeth, aids in the absorption of fats and sugars, acts as a carrier of fat in the blood, aids in burning fats and sugars to produce energy, is necessary for growth, and is an essential part of the nucleus of every cell in the body.⁶⁵ Mild deficiencies are noted when bones fracture easily.

Almost every known food contains some phosphorus.⁶⁶ Very good sources are milk, meat, eggs and cheese. Cereals, nuts and legumes are considered good sources.

Iodine: Iodine is a mineral people of South Dakota and the Great Lakes area⁶⁷ should be most concerned about. They live in what is termed a borderline area, which means some iodine is made available to them by natural resources but not enough to insure them of no ill effects from its deficiency.

The athlete needs iodine for the proper functioning of the thyroid gland.⁶⁸ This gland effects growth, mental and physical development and

⁶³Proudfit, op. cit., p. 79.

⁶⁴Proudfit, op. cit., p. 82.

⁶⁵Proudfit, op. cit., p. 82.

⁶⁶Proudfit, op. cit., p. 82.

⁶⁷Proudfit, op. cit., p. 86.

⁶⁸Proudfit, op. cit., p. 86.

the general health of the body. Without iodine the thyroid gland of the neck enlarges either internally or externally and this condition is known as goiter.⁶⁹

If a person is lacking iodine,⁷⁰ but not yet suffering from goiter, he may notice that his body activities are carried on more slowly. The body may become sluggish, breathing may be more deliberate, the heart may beat slower, digestion may be less vigorous and the individual may be constipated. Less calories may be burned contributing to laziness, low endurance, and a flabby fat appearance. His physical appearance may be effected by poor circulation giving him a dry skin, lifeless hair, peeling fingernails which break easily, and cold hands and feet but still he may suffer abnormally from the heat. He may be extremely nervous and have its numerous resultant conditions.

The chief source⁷¹ of iodine is the ocean. Sea foods are very rich in iodine but for those who live so far from the ocean, they must depend entirely on something else such as iodized salt. Other foods grown on soils rich in iodine or soil waters from the ocean are good sources, however, due to transportation progress, people cannot depend on their food supply to come from these areas. Modern transportation has made it so people do not know where foods are grown or on what type of soil they are grown.

The vitamin and mineral needs of the body are summarized by a

⁶⁹Proudfit, op. cit., p. 86.

⁷⁰Proudfit, op. cit., p. 86-87.

⁷¹Proudfit, op. cit., p. 86.

statement from the writings of O'Donnell and Krehl.

With respect to vitamins and minerals, nutritionists generally agree that if the diet is a good one, such as would be used by most athletes under average conditions, the mineral and vitamin requirements will take care of themselves.⁷²

The varied importance of each food component was noted in the foregoing discussion and the writer feels it should be stressed here that there is great importance in the proper balance of all of these nutrients. The individual usually has a proper height-weight ratio to maintain, he generally has to assure himself of proper physical and mental development, and perhaps he may have special problems such as needing to reduce, or to gain weight, or perhaps previous illness or allergies have left their mark. A properly balanced diet to fit each individual need seems to the writer to be a solution to the diet problem.

The writer feels it is generally noticed that eating habits change from time to time, from one area to another, and from family to family. Authorities, such as Stackhouse, Doller, and Upjohn, in general agree with the theory brought out by O'Donnell and Krehl,⁷³ that frequent eating is actually better for the stomach than three large meals each day. An empty stomach contracts more than one with food in it, however, a person must be sure they do not consume larger quantities of food than are needed with more frequent eating. An ideal condition⁷⁴ is to eat a heavy breakfast quite

⁷²O'Donnell, op. cit., p. 67.

⁷³O'Donnell, E. D., and Krehl, W. A., "Ideal Meals for the Athlete," Scholastic Coach 24:49, November, 1954.

⁷⁴Ibid., p. 48.

early, have a relatively small mid-day meal and a fairly large supper with mid-meal snacks of fruit, vegetables, a small sandwich or milk.

— It is generally understood by all⁷⁵ that the daily eating is very important to the athlete, but it is the concern of the coach to be sure the same nutritional practices are used before contests. Some⁷⁶ say it may even be better for some athletes not to eat the day of the game as the emotional strain is too much, others may say to eat a good breakfast and eat sparingly the rest of the day.

Because of the emotional factors which delay digestion of food, it is generally desirable not to have a heavy meal less than three to four⁷⁷ hours prior to actual game time. Again, this is often a highly individualistic matter, but the young athlete should be warned that eating a big steak before game time may be more likely to hurt than to help him.⁷⁸

The diets of the people in the nation have been summarized in one statement by the National Research Council. This one statement is: "All the evidence from numerous surveys of persons of all ages in many localities is without exception and are in complete agreement that inadequate diets are widespread in the nation."⁷⁹ The writer feels that the thought in this statement concerns everyone. A survey in 1952-1953 by Charles Schwartz,⁸⁰

⁷⁵Ibid., p. 48.

⁷⁶Ibid., p. 48.

⁷⁷Ibid., p. 48.

⁷⁸Ibid., p. 48.

⁷⁹Bulletin of National Research Council, no. 109, 1943.

⁸⁰Schwartz, Charles, A Survey of the Nutritional Habits of South Dakota School Children, University of South Dakota, 1952.

University of South Dakota, of 26,700 children in South Dakota schools, showed that children's diets are deficient in the following groups in this order: Milk, Vitamin C rich foods, other fruits, and leafy green and yellow vegetables. From conclusions reached during the study of these surveys it seems very apparent to the writer that diet should be the concern of everyone, including the coach.

It may be a problem to be sure each food nutrient is included in the diet every day. For convenience in nutrition work, foods have been identified in groups known as the "Basic 7"⁸¹ food groups, the number of servings per day needed from each group are also listed. If diets are planned around the Basic 7 a person can be assured of a well balanced diet which may generally result in better performance by athletes.

This chapter has given a view of the basic nutritional requirements for all as well as for the athlete. Recommendations, as to what foods may actually be included in the diet so as to meet the nutritional requirements, have been written after a study of the basic essentials. These recommendations appear in Chapter IV.

⁸¹"Food and Fitness (Balanced Meals)," Scholastic Coach 23:32, April, 1954.

CHAPTER IV

RECOMMENDATIONS TO GOOD EATING

In Chapter III the actual nutritional requirements of the body for activity, growth, repair and heat, as are generally needed by the athlete, were discussed. In this chapter are presented recommendations, based on body needs, to help the coach meet these nutritional requirements for the athlete.

It is generally true that all kinds of food are good for the body, but for maximum health the human body needs variety in the foods eaten. The human bodies are made up of many materials which must be supplied by the foods that are eaten. As was previously stated, the body must have foods that yield energy, foods that supply the materials for growth and upkeep, and foods to keep bodies in good running order.

A person can get all the right kinds of food needed for health by using a simple guide, called the Basic 7.¹ A person should be sure to include at least the minimum number of servings from each group of the Basic 7 in their diet each day. The coach or trainer may make it a point to provide extra large servings to teen-agers and active athletes to account for extra energy needed for vigorous athletic activity.

Table IV gives the names of the Basic 7 food groups and also the number of servings recommended per day for an individual so as to receive a well-balanced diet. The size of the servings should vary so as to meet

¹"Food and Fitness (Balanced Meals)," Scholastic Coach 25:32, April, 1954.

the total calorie needs of the certain individual, whether they are a child, adult, or active athlete.

TABLE IV. THE BASIC 7 FOOD GROUPS*

<u>Number and Name</u>	<u>Servings Per Day</u>
1. Leafy, green, and yellow vegetables	One or more
2. Citrus fruit, tomatoes, raw cabbage	One or more
3. Potatoes and other vegetables and fruit	Two or more
4. Milk, cheese ice cream	Children 3 to 4 cups Adults 2 or more
5. Meat, poultry, fish; eggs; dried beans and peas, nuts	One Four or more a week Two or more a week
6. Bread, flour, and cereals	Every day
7. Butter and fortified margarine	Some

*Bowes, A., and Church, O., Food Values of Portions Commonly Used, 7th Edition, College Offset Press, Philadelphia, January, 1951, p. 7.

The number given to each group, the name of the group and number of servings of the Basic 7 food groups were given in Table IV. These may have little meaning to the coach-trainer who is unfamiliar with nutrition. To help the coach select foods for the diet of the athlete the writer has provided Table V which gives the names of many of the foods included in each of the Basic 7 food groups. For the sake of not repeating material already included in other tables, only the number of the group and the common foods found in that group will be included in Table V.

TABLE V. FOODS INCLUDED IN THE BASIC 7 GROUPS*.

<u>Group I</u>	<u>Group II</u>	<u>Group III</u>
Asparagus, green	Grapefruit	Potatoes
Beans, snap, green	Grapefruit juice	Sweetpotatoes
Beans, lima	Kumquats	Artichokes
Broccoli	Lemons	Beets
Brussels sprouts	Limes	Cabbage, white
Cabbage, green	Oranges	Cauliflower
Chard	Orange juice	Celery
Collards	Tangerines	Corn, sweet
Endive, green	Tomatoes	Cucumbers
Escarole	Tomato juice	Eggplant
Kale	Cantaloups	Lettuce, head
Lettuce, leaf	Pineapples, raw	Onions
Mustard greens	Strawberries, raw	Parsnips
Okra	Cabbage, raw	Radishes
Peas, green	Greens, salad	Rutabagas
Peppers, green and red	Peppers, green, raw	Sauerkraut
Spinach	Turnips, raw	Squash, summer
Turnip greens		Turnips
Wild greens		Apples
Salad greens		Apricots
Carrots		Avocados
Pumpkins		Bananas
Squash, winter yellow		Berries
Sweetpotatoes		Cherries
		Cranberries
		Currents
		Dates
		Grapes
		Peaches
		Pears
		Plums
		Prunes
		Watermelons

*Bowes, A., and Church, C., Food Values of Portions Commonly Used, 7th Edition, College Offset Press, Philadelphia, January, 1951, p. 7.

TABLE V (Continued)

<u>Group IV</u>	<u>Group V</u>	<u>Group VI</u>	<u>Group VII</u>
Milk:	Beef	Breads:	Butter
Whole	Veal	Whole-wheat	Fortified marg-
Skim	Lamb	Dark rye	arine
Evaporated	Mutton	Enriched	
Condensed	Pork	Oatmeal bread	
Dried		Crackers	
Buttermilk	Lunch meats	Flour:	
Cheese	Liver	Enriched	
Ice cream	Heart	Whole-wheat	
	Kidney	Corn Meal	
	Brains	Grits, enriched	
		Cereals:	
	Tongue	Whole-wheat	
	Game	Rolls oats	
	Chicken	Brown rice	
	Duck	Converted rice	
	Goose		
	Turkey		
	Fish		
	Dried beans		
	Dried peas		
	Lentils		
	Soybeans		
	Eggs		
	Nuts of all kinds		

Foods within each group in Table V may be much alike in food value, so one can replace another and therefore give many more choices in each group. It may be noted in Table V that a few foods are already given in more than one group. Though all of the food groups could, and often do appear in one meal, this is not necessary, as it is the total for the day that counts. The coach or athlete, when totaling the food intake for a day, should be sure

one serving of food is not counted twice, even though it is listed in more than one group.

From a study of Tables IV and V, the coach-trainer should be able to get a better idea of what foods the growing athlete should have in his diet. The Basic 7 serves as a guide for the coach or athlete in selecting the diet of the athlete. The recommendations as to what constitutes a well-balanced diet, are supported by O'Donnell and Krehl,² Doller,³ Montoye and Hunsicker,⁴ Johnson,⁵ Upjohn,⁶ and by the Bureau of Human Nutrition and Home Economics.⁷

The coach and athlete may find cases where the athlete is meeting the nutritional requirements of the body for growth, repair and health in the Basic 7, but due to increased activity from athletics the athlete may desire additional energy foods. Table VI lists foods that give chiefly energy so as to help take care of the extra requirements made of the body for activity. The foods listed in Table VI are to be eaten in addition to the well-balanced diet when the body activity is such that extra energy is needed.

²O'Donnell, E. D., and Krehl, W. A., "Diet and the Athlete," Scholastic Coach 24:66-67, September, 1954.

³Doller, J., "Food For Thought," Athletic Journal 35:56, September, 1954.

⁴Montoye, H. J., and Hunsicker, P. A., "B₁₂ In Athletics," Athletic Journal 35:53-54, March, 1955.

⁵Johnson, W. R., "How Good Are Pre-Competition Super-Foods?" Athletic Journal 33:14, February, 1953.

⁶Upjohn, H. L., and others, "Feeding the Athlete," Scholastic Coach 23:36, September, 1953.

⁷Bureau of Human Nutrition and Home Economics, National Food Guide, Pamphlet no. 288, Washington D. C., August, 1946.

TABLE VI. EXTRA ENERGY REQUIREMENT FOODS*

<u>Foods</u>		
Bacon	Molasses	Candy
Drippings	Preserves	Chocolate
Lard, other shortenings	Sirup	Cocoa
Mutton fat	Sorghum	Cookies
Poultry fat	Corn meal, degerminated	Pastries
Salad dressings	Cornstarch	Unenriched:
Salad oils	Hominy grits	Crackers
Salt pork, fat back	Macaroni	White bread,
Suet	Noodles	rolls
Honey	Rice, white	White flour
Jams	Spaghetti	Sugar
Jellies	Cakes	Other sweets

*Bureau of Human Nutrition and Home Economics, National Food Guide, Pamphlet no. 288, Washington D. C., August, 1946.

The foods listed in Table VI may be eaten in addition to the Basic 7 foods, but not in place of them. If these foods were to be eaten in place of the Basic 7 foods the diet may resort back to an unbalanced diet and not fulfill the nutritional requirements of the body.

Chapter V is written to bring together the problems confronting the coach about the diet of the athletes, the actual nutritional requirements of the athlete, and the recommendations for a well-balanced diet, so as to enable greater athletic performance by the athlete.

CHAPTER V

SUMMARY AND CONCLUSIONS

In a recent U. S. News and World Report¹ magazine it was said that youths are getting bigger, and people are eating better than ever before. An average American college boy today is nearly four inches taller than his great-grandfather.² Girls are bigger too. Why? The secret, scientists say, is the great improvement in this nation's diet. Youngsters get more vitamins and minerals. The outlook is for food to remain plentiful and diets to become even better. Should this be true, the next generation will probably be even bigger. Through the years children have been consuming more and more of the proteins, vitamins and minerals that build bones and muscles, laying the foundation for maximum growth. This is true for body development, but does this extreme food abundance make our athletes perform better?

In order to gain an idea on what to feed the athlete, it is perhaps essential to see what he has been eating. From a survey conducted jointly by the Yale Nutrition Laboratory³ and the Yale Athletic Department, and from the studies made by Stackhouse,⁴ Doller,⁵ Montoye and Hunsicker,⁶ Johnson,⁷

¹"Why Youths Are Getting Bigger," U. S. News and World Report, June 3, 1955, p. 64.

²Ibid., p. 64.

³O'Donnell, E. D., and Krehl, W. A., "Diet and the Athlete," Scholastic Coach 24:38, September, 1954.

⁴Stackhouse, G. R., "Eating Habits of World Olympic Athletes," Athletic Journal 34:20, March, 1954.

⁵Doller, J., "Food For Thought," Athletic Journal 35:36, September, 1954.

⁶Montoye, H. J., and Hunsicker, P. A., "B₁₂ In Athletics," Athletic Journal 35:53-54, March, 1955.

⁷Johnson, W. R., "How Good Are Pre-Competition Super-Foods?" Athletic Journal 35:14, February, 1955.

and Upjohn,⁸ it is evident that there is no uniformity among coaches or dietitians as to what to feed an athlete. This conclusion was reached after an analysis of the actual menus being used by many colleges. Most of the practices seem to have been based on the coach's particular likes and dislikes.

Considerable controversy exists over the protein needs of the athlete. Historically speaking, protein has always been the chief dietary component of the hard-working individual. However, the protein requirement standards used in the early part of the century were considerably higher than those in use today.

The question of when milk should be consumed by athletes prior to athletic contests is debatable. This is difficult to believe on the physiological grounds because of the rapidity with which milk, a fluid substance, leaves the stomach. The problem of the curd development and digestibility of the curd in milk is another matter. But this problem can be greatly minimized when homogenized, rather than whole milk is used, since a softer, more rapidly digestive curd is formed from homogenized milk.⁹

The eating of sweets is also debated. Pie, cake and candy consumed in moderate quantities after the evening meal provide calories. If these calories are adequately protected by a generally good diet, then there is no sound physiological reason for excluding these foods from the diet. They confer a great deal from the standpoint of palatability and are generally liked by young people.¹⁰

⁸Upjohn, H. L., and others, "Feeding the Athlete," Scholastic Coach 23:36, September, 1953.

⁹O'Donnell, op. cit., p. 38.

¹⁰O'Donnell, op. cit., p. 38.

With regard to fat, the writer feels it is important to point out that it is not necessary to trim the fat away from meats and other foodstuffs when eating a meal. Instead of carefully trimming the excess fat from a piece of meat, the athlete should often be eating it in order to obtain his essential caloric intake without having to stuff himself with foods of low caloric value. Doctors actually say that fat eating during warm weather keeps the body cooler.

In addition to some of these conclusions about what to eat, is the question of when athletes should eat before athletic activities, especially contests. It depends solely upon the individual but when team rules are set it is best to follow procedure. Many athletes have extremely nervous systems and when emotion appears all digestion stops. A coach must find this out in advance and plan accordingly. An athlete of this type should be fed early and kept occupied prior to contests so digestion completes itself.

Rushing through a meal or eating when upset or worried interferes with the digestion. While this nervous tension may not completely kill the appetite, it certainly lessens it. Furthermore, it impairs the functioning of the digestive juices as has been mentioned before.

With respect to vitamins and minerals, nutritionists generally agree that if the diet is a balanced diet, such as would be used by most athletes under average conditions, the mineral and vitamin requirements will take care of themselves.

This may be an over simplification of the problem. Though there is still a lot to be learned about vitamin requirements, particularly in regard to activities involving excessive energy expenditure, such as athletics, it

would appear that supplementary vitamin feeding offers a reasonable solution to the problem.

It is extremely wise to pay careful attention to the athlete's weight record both during the course of his training and during the competitive season. This particularly applies to the schoolboy athlete, who is a growing boy. If his weight remains stationary, you may deduce that his growth is also standing still; or, if he had been overweight to begin with, that his fat is being hardened by competition.

A little knowledge about foods increases the pleasure of eating, and there is a lot of satisfaction in knowing that the skin grows clearer, and that muscles grow firmer and the body taller with every glass of milk an athlete may drink during a well-balanced meal.

From this investigation the final conclusion is reached that a well-balanced diet will lead to greater performance in athletics than will a diet of any special foods.

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