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Nutrition Knowledge Of Illinois High School Athletic Coaches

Donall M. Hausauer

Eastern Illinois University

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NUTRITION KNOWLEDGE OF ILLINOIS
HIGH SCHOOL ATHLETIC COACHES

HAUSAUER

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NUTRITION KNOWLEDGE OF ILLINOIS

HIGH SCHOOL ATHLETIC COACHES

(TITLE)

BY

DONALL M. HAUSAUER

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE IN PHYSICAL EDUCATION

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1995

YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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May 8, 1995
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M. Thomas Woodruff
ADVISER

May 5, 1995
DATE

Phoebe Church
DEPARTMENT HEAD

ABSTRACT

Research studies on the nutrition knowledge of high school athletic coaches are few in number, old, and limited to certain geographical areas. Therefore, it seemed appropriate to survey a large number of high school athletic coaches in the state of Illinois to assess their level of nutrition knowledge.

A cover letter and a questionnaire were sent to the athletic director of 203 randomly selected Class A and Class AA Illinois high schools from the North, Central and Southern parts of the state, as listed in the 1994 Illinois High School Association Member School Directory. Coaches from approximately 49 percent of the Illinois high schools sampled responded to the questionnaire.

Questionnaire items were designed to determine the coaches age, gender, years of coaching experience, sport(s) coached, teaching responsibilities, sources of nutrition information, and whether the coaches gave nutrition advice to their athletes. The nutrition knowledge questions addressed topics such as fluids and hydration, nutritional supplementation, the pre-competition meal and composition, special dietary concerns, and general nutrition.

The major finding of this investigation was that Illinois high school athletic coaches' averaged 76 percent correct for

overall nutrition knowledge. Only 4.5 percent of the coaches scored below 50 percent correct, while one-third of the coaches scored greater than 80 percent correct. Though it is hard to compare the degree of difficulty between questionnaires from various studies, it appears that the athletic coaches in the present study showed superior knowledge.

Within the individual subsections, the highest score, 89 percent, was in the pre-competition meal and composition category. The lowest score, 72 percent, occurred in the nutritional supplementation category.

An analysis of variance and t-tests were performed to determine if there were any statistically significant differences in the nutrition knowledge scores by geographic location and school enrollment size, and also between selected paired comparisons (male-female, older-younger, experience-inexperience). The only comparison in which a statistically significant difference was found occurred when those with greater than 5 years of coaching experience demonstrated superior knowledge in the pre-competition meal and composition category.

This investigation also revealed other important information about Illinois high school athletic coaches. The most frequently reported teaching responsibility was in physical education. Undergraduate classes were the coaches leading source of nutrition information. And, many of the coaches reported that they give nutrition advice to their

athletes. The coaches most frequently gave advice on fluids and hydration(93 percent), while the coaches were most hesitant about giving nutritional supplementation(34 percent) advice.

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CHAPTER 1

INTRODUCTION

There is no area of nutrition where faddism, misconceptions, and ignorance are more obvious than in athletics (Short et al., 1983). Often coaches, trainers, and even team physicians dispense misleading nutrition information thus making the nutritional status of the athlete a topic of great concern. Furthermore, the performance of an athlete can be impaired significantly as a result of a faulty or inadequate diet.

A review of the literature regarding nutrition and athletics makes one conclusion apparent: Although the basic needs of athletes during training do not differ significantly for various sports and do not vary except in quantity from the basic nutrition requirements of less active individuals, any deficiency has more marked effects in the athlete (Bedgood et al., 1983). Fatigue and poor performance result from deprivation of kilocalories, carbohydrate, fluids, and sodium chloride.

Clearly, individuals who work closely with athletes should have accurate nutrition information that will help them make sound decisions. In fact, athletes should expect

meaningful nutritional guidance just as they expect sound training.

Significance of the Study

The nutrition knowledge and practices of coaches have not been well documented. The athletic coach occupies a key position that influences the nutrition practices of athletes. Like the general public, coaches are bombarded with nutrition misinformation and fad diets through the mass media. Coaches need to recognize how diet affects physical performance, and they should be able to distinguish between factual nutrition information and misinformation.

Poor nutritional and dietary practices can affect both performance and the physical development of athletes and ultimately be carried over into their adult lives (Bentivegna et al., 1979). Since a majority of coaches (53 percent) perceive themselves as the primary provider of nutrition information to athletes, their knowledge of nutrition is an important topic (Graves et al., 1991).

The results of this study will provide insight as to the level of nutrition knowledge of high school coaches in the state of Illinois. In addition, this investigation may also provide information about the misconceptions currently held by high school coaches.

Purpose of the Study

The purpose of this study was to determine the level of nutrition knowledge of high school coaches in the state of Illinois.

Limitations of the Study

As with any questionnaire, unanswered questions or invalid responses could result in a misinterpretation of the data. Though an eight member jury of experts reviewed and approved the questionnaire, the use of a more thorough pilot study might have aided in better detection of questionnaire flaws.

Definition of Terms

Amino acid- a building block of protein

Carbohydrate- an essential nutrient that serves as the body's most readily available source of energy for the muscles during vigorous exercise

Carbohydrate Loading- a training and diet regimen that increases the available glycogen stores in the muscles

Dehydration- a condition that results from excessive loss of body water

Fat- a concentrated source of dietary energy used primarily for low to moderate intensity, long duration exercises

Iron- a mineral that is a part of hemoglobin and assists in oxygen transport

Protein- an essential nutrient whose primary function is to build and repair body tissues

Supplement- an addition to one's diet

Vegetarian diet- excluding some or all animal derived foods from the diet

Vitamin- compounds that function as metabolic regulators in the body

CHAPTER II

REVIEW OF RELATED LITERATURE

In the first portion of this chapter, studies will be reviewed concerning the nutrition background of athletic coaches in an attempt to determine whether they have sufficient training and education in the field of nutrition to be dispensing nutrition information. The second portion of the chapter will summarize research findings relative to the coaches' knowledge in five important areas of nutrition for the athlete. The categories include: fluids and hydration, nutritional supplementation, the pre-competition meal and composition, special dietary concerns, and general nutrition.

Nutrition Background

A publication of the American Association for Health, Physical Education, and Recreation suggests that the coach is currently counselling in nutrition practice even more than in the past (Bedgood et al., 1983). With more coaches counselling in nutrition these days, the question arises as to whether coaches are qualified to be giving nutrition advice. Corley et al. (1990) studied 105 college coaches in the state of North

Carolina and reported that 82 percent of the coaches stated that they never completed a college-level course in nutrition. Further, Parr et al. (1984) revealed that out of 348 coaches surveyed throughout the United States, 61 percent had no formal background in nutrition. In addition, Graves et al. (1991) surveyed 152 high school coaches in North Carolina and found 23 percent of the coaches had never attended a nutrition-related workshop or course.

In a survey of 92 Class AAAA high school football, basketball, and track coaches in the state of Texas, Bedgood et al. (1983) found that 90 percent of their respondents thought that it would be helpful for coaches to participate in a nutrition course or workshop, since only 11 percent of the coaches in the study had taken a separate course in nutrition. Wolf et al. (1979) reported that 78 percent of Big Ten Conference athletic coaches surveyed felt a need for more knowledge on diet and nutrition.

In a study by Bentivegna et al. (1979) 75 coaches and trainers involved primarily in football programs were asked how they perceived themselves in terms of being up to date on new information related to nutrition. None of the group perceived themselves to be up to date. Forty-three percent felt that they were moderately informed and a majority (56 percent), said that they needed more nutrition information. The results of the study revealed that the respondents' perception of themselves in terms of understanding correct

nutrition information was accurate. In using 70 percent as the criteria for being considered up to date, the results indicated that 95 percent of the group had obsolete or inaccurate nutritional knowledge.

An athlete's level of nutrition knowledge can also indirectly reflect coaches' nutrition knowledge. Shoaf et al.(1986) studied 75 male college athletes in Tennessee and found that the athletes answered only 43 percent of the nutrition knowledge questions correctly. It was revealed that the athletes in this survey obtained most of their nutrition information from parents(34 percent), high school physical education/health courses(28 percent), college health courses(26 percent), and high school coaches(22 percent). It was concluded that health and physical education teachers as well as coaches at both the high school and college level need to consider including a basic nutrition course in their professional preparation to provide more accurate and adequate nutrition education to athletes.

Nutrition Knowledge of Athletic Coaches

Fluids and Hydration

For many years it was common practice to prohibit the consumption of water during practice sessions and athletic contests in order to toughen up the athlete(Bentivegna et al.1979). Fortunately, water deprivation has been exposed as

hazardous and it no longer seems to be prevalent (Bentivegna et al. 1979, Parr et al. 1984, and Corley et al. 1990). A survey by Bentivegna et al. (1979) of 75 coaches and athletic trainers revealed that only 2.5 percent of the coaches did not provide water during practice sessions or events.

Parr et al. (1984) found that fluid intake was the area of greatest concern for the coaches throughout the United States they studied. The coaches felt that dehydration was probably the major limiting factor in athletic performance. One-third of the 105 North Carolina college coaches surveyed by Corley et al. (1990) also recognized the importance of fluid replacement and reported that they monitor dehydration among their athletes. Of the coaches who monitor dehydration, more than half used weight records and 41 percent used visual observation. Disturbingly though, Bedgood et al. (1983) reported that 77 percent of Texas Class AAAA high school coaches failed to realize that thirst was not an adequate indicator of the need for water.

Nutritional Supplementation

Wolf et al. (1979) found that nutrient supplementation was widespread in varsity sports within the Big Ten Athletic Conference. Thirty-five percent of the coaches prescribed vitamin supplements to all or some of their players, and about half of the coaches who instruct team members to take vitamin supplements actually dispense them. More recently, Corley et

al. (1990) surveyed 105 North Carolina college coaches and found 60 percent of them were recommending vitamin/mineral supplements for their athletes. In a nationwide study of coaches and athletic trainers, Parr et al. (1984) reported that vitamin supplements were taken by 46 percent of the high school athletes and 42 percent of the college athletes they studied.

In 1979, Bentivegna et al. reported that 51 percent of the coaches and trainers they studied believed that dietary protein was the major factor promoting increased muscle mass. In 1983, Bedgood et al. revealed that 61 percent of Texas Class AAAA high school coaches agreed that supplementation with protein helps to increase muscle mass. However, in contrast to the previously mentioned studies, Corley et al. (1990) found that 91 percent of the 105 North Carolina college coaches they surveyed promoted the proper method to increase muscle mass - weight training. Only two percent of the coaches recommended protein supplements to increase muscle mass.

The Pre-Competition Meal and Composition

The timing of the conventional pre-competition meal is important. Several studies (Corley et al. 1990, Wolf et al. 1979, and Bentivegna et al. 1979) suggest that the pre-competition meal should be eaten three to five hours before the event. Corley et al. (1990) uncovered that 58 percent of

the North Carolina college coaches they surveyed allowed adequate time between the pre-competition meal and the sports event. Bedgood et al.(1983) reported that 89 percent of the Class AAAA high school coaches in Texas responded appropriately to a survey question regarding the timing of the pre-competition meal.

Coaches also need to be familiar with the pre-competition meal composition, because, in a study of North Carolina college coaches, Corley et al.(1990) revealed that the pre-competition meal planning was the responsibility of approximately 50 percent of the coaches surveyed. Several authors(Wolf et al. 1979, Bedgood et al. 1983, and Corley et al. 1990) concluded that the pre-competition meal should be high in carbohydrates and low in protein and fat. However, Wolf et al.(1979) found that 13 percent of Big Ten Athletic Conference coaches still regard steak and other high protein food as an essential component of pre-competition meals. On the other hand, Bedgood et al. (1983) reports that Texas Class AAAA high school coaches were knowledgeable about restricting fat in the pre-competition meal, with 89 percent of coaches responding appropriately to this survey question.

Special Dietary Concerns

Special dietary concerns, such as weight loss and carbohydrate loading, are monitored by most coaches(Bedgood et al. 1983 and Corley et al. 1990). Corley et al.(1990) found

that 60 percent of North Carolina college coaches reportedly supervise the weight loss and/or gain of their athletes. The coaches acknowledged the role of diet (decreased caloric intake) (80 percent) and physical activity (53 percent) in promoting weight loss. The authors went on to say that about half of the coaches recommended increased calorie intake from the basic four food groups to promote weight gain, and one-third of the coaches recognized the role of weight training in promoting weight gain.

In a study of coaches from the Big Ten Athletic Conference, Wolf et al. (1979) stated that 39 percent of the coaches of female teams prescribed diets for weight loss, compared with 26 percent of male team coaches. Further, in response to the question "How do you usually determine the optimum weight for an athlete in your sport?" most male coaches replied, "by appearance" and "by performance at preseason practice", while most female coaches replied "no method" and "appearance". It was also determined that coaches of gymnastics, football, and ice hockey more commonly prescribe diets for individual weight loss or gain than coaches in other sports.

In a study of 105 North Carolina college coaches, Corley et al. (1990) revealed that approximately 35 percent of the coaches recommended carbohydrate loading. But, according to Bedgood et al. (1983) "coaches are not knowledgeable about carbohydrate loading". Sixty-eight percent of the Texas Class

AAAA high school coaches the researchers studied did not recognize the fact that carbohydrate loading is ineffective for athletic events lasting less than one hour. Further, 72 percent were uncertain about total abstinence from carbohydrates during the depletion phase, with only 16 percent recognizing the inaccuracy of this statement.

Shoef et al.(1986) found that athletes are also unfamiliar with the concept of carbohydrate loading. In a study of 75 male athletes on track, baseball, and football teams, the authors reported that only 28 percent of the athletes in the study recognized the definition of carbohydrate loading.

General Nutrition

The North Carolina college coaches surveyed by Corley et al.(1990) were least informed about questions addressing general nutrition issues. Few of the coaches(18 percent) knew that carbohydrates and protein provided the same amount of energy per gram, and less than half recognized that eggs are the best food source of high quality protein. In contrast, Bedgood et al.(1983) studied 92 Texas Class AAAA high school coaches and reported that the coaches scored highest in the general nutrition category. The coaches in this study were knowledgeable about achieving good nutritional status by a balanced diet, the psychological benefits of certain foods, the need for fiber, the importance of breakfast, the need to

abstain from alcoholic beverages during training, the inclusion of bread and potatoes in the training diet, and the inadequacy of a meal composed of a hamburger and a carbonated drink.

Bentivegna et al.(1979) revealed that the majority(51 percent) of coaches and trainers they studied incorrectly indicated that the most desirable diet consisted of 45 percent carbohydrates, 45 percent protein, and 10 percent fat. A survey of North Carolina college coaches by Corley et al.(1990) reported similar findings to the previous study, only 20 percent of the coaches could correctly identify the recommended distribution of calories from fat, carbohydrates, and protein in a training diet.

Summary

Past research indicates that coaches may not be the best source of nutrition information because they are inadequately prepared to provide guidance in nutrition. However, research studies on the nutrition knowledge of high school coaches are few in number, old, and limited to certain geographical areas. Only three research studies were found that deal with the nutrition knowledge and practices of high school coaches; two were over 10 years old and the other was done in 1991. Also, the studies were limited to high school coaches in the states of North Carolina and Texas. Therefore, it seemed appropriate

to survey a large number of high school coaches in the state of Illinois to assess their level of nutrition knowledge.

CHAPTER III

METHODOLOGY

This investigation focused on the nutrition knowledge of high school athletic coaches within the state of Illinois.

Population

Schools

All high schools listed in the 1994 Illinois High School Association (IHSA) Member School Directory were placed into one of six different categories based on geographic location and the number of students enrolled. The geographic location of the high schools was determined using the following boundaries: North of Interstate 80 was labelled North; south of Interstate 80, but, north of Interstate 70 was labelled Central; and south of Interstate 70 was labelled South.

Each category (North, Central, and South) was then subdivided into class AA and A categories based on the size of the student population. Schools with more than 690 students were designated as AA, while those with less than 690 were classified as A. The resulting six categories were North AA (239 high schools), Central AA (45 high schools), South AA (23

high schools), North A(135 high schools), Central A(220 high schools), and South A(91 high schools).

The investigator chose to sample 27 percent of the high schools from each category, and used a table of random numbers to select the sample. Questionnaires were mailed to a total of 203 high schools throughout the state in the following manner. The distribution to Class AA was 64, 12 and 6 to the North, Central and South, respectively. Class A distribution was 36, 60, and 25 to the North, Central and South, respectively. This bulk mailing was performed on March 1, 1995.

Coaches

Most of the schools selected had from 5 to 20 men and/or women coaches in a variety of sports. In order to sample as many coaches as possible at each of the schools, and for budgetary reasons, the questionnaires were mailed to the Athletic Director with a brief cover letter(Appendix A), asking him/her to distribute the questionnaire amongst all the coaches at the school. The coaches were asked to complete the questionnaire by March 20, 1995 and return them to the Athletic Director, who in turn would mail them back to the investigator in the pre-addressed, stamped envelopes provided. It was the investigator's belief that, with the Athletic Director's influence, coaches would complete the questionnaire and return it immediately.

Questionnaire

Design and Construction

A questionnaire was designed by the investigator to collect data that would reveal the nutrition knowledge of athletic coaches in the study. A review of literature served as a basis for the selection of five important areas of nutrition for the athlete. The areas include: fluids and hydration, nutritional supplementation, the pre-competition meal, general nutrition, and special dietary concerns.

Concept statements were formed to address key points within each of the five areas. Both facts about nutrition as related to athletics and misconceptions frequently held by coaches were considered. Questions were then developed that assessed each concept statement.

A jury of eight experts, four in the field of nutrition and four in the field of exercise physiology, were asked to validate the questionnaire. Each member was given a typed set of instructions, an evaluation form, concept statements and questions (Appendix B). They were instructed to indicate whether the concept statements were important sports nutrition considerations, determine if the questions were really assessing the concept statements, and make comments on concept statements or questions that needed to be rewritten. The jury was also asked if, in their opinion, had all of the important areas in sports nutrition been addressed. Based on the

recommendations of the expert jury(Appendix C), modifications were made to the questionnaire.

Descriptors: Coaches

Questions in this section(n=8) were constructed to describe the coach in a variety of ways. The coach's gender, age, years of coaching experience, and sport(s) coached were identified. In addition, teaching responsibilities were assessed with questions addressing teacher certification and subject area(s) taught. It also seemed appropriate to question the coaches about their source of nutrition information, and also whether they gave nutrition advice.

Nutrition Knowledge

This section of the survey was constructed with the goal of assessing the nutrition knowledge of high school athletic coaches. For the 20 questions in this section the respondent had to circle either "AGREE" or "DISAGREE". Questions were developed to address five important areas of nutrition for athletes. The questions concerning fluids and hydration(n=4) dealt with fluid intake and sports drinks; the nutrition supplement questions(n=4) targeted vitamin/mineral and protein/amino acid supplementation; pre-competition meal questions(n=3) focused on the content and timing of the pre-competition meal; the general nutrition category had questions(n=4) about fuels for exercise and training diet

composition; and questions about special dietary concerns (n=5) included topics such as weight loss/gain, vegetarian diets, eating disorders, and carbohydrate loading.

Returns

To encourage a high rate of returns, it was decided that the questionnaire should be relatively short in length and require minimum effort on the part of the respondent. On paper, color coded for geographic location and school enrollment size, a two-sided, one page questionnaire was developed (Appendix C). In most instances coaches needed only to circle their responses, though a few items required them to write on a blank line. The demographic questions were placed first on the questionnaire in hopes of allowing coaches to feel more comfortable in starting to answer the questions. To encourage honest responses, the respondents were not required to identify themselves.

To further increase the likelihood of return; envelopes were hand addressed to the individual schools, EIU letter head was used for the cover letter, and self addressed stamped envelopes were enclosed in the mailing. The Director of Eastern's Human Performance Lab (Dr. Thomas Woodall) signed the cover letter and commented on the importance of this study with a brief statement at the bottom of the letter. This was done in hopes of giving more credibility to the project.

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Analysis of the Data

On April 3, 1995, approximately 4 weeks following the mailing of the survey, an analysis of the data began. The data were entered for statistical analysis using the Statistical Package for the Social Sciences (SPSS) Version 4.0 (1990). For each coach, an overall nutrition knowledge score was calculated as the number of correct responses out of 20 questions. Knowledge scores were also calculated for each of the five nutrition areas. Means, standard deviations, and frequency counts were calculated for variables describing the sample. Independent t-tests were used to determine whether differences in nutrition knowledge scores existed for selected groups of coaches (male-female, older-younger, more experienced-less experienced). An analysis of variance was performed to determine whether differences in nutrition knowledge scores existed between the different geographic locations and school enrollment sizes.

CHAPTER IV

RESULTS AND DISCUSSION

Questionnaires were mailed to 203 randomly selected Class A and Class AA Illinois high schools from the North, Central and Southern part of the state in an attempt to determine the nutrition knowledge of athletic coaches. The nutrition knowledge questions which appeared on the questionnaire addressed specific areas of nutrition important to the athlete: fluids and hydration, nutritional supplementation, the pre-competition meal and composition, special dietary concerns, and general nutrition.

The following three sections describe the data obtained from the questionnaire. The response rate from the sampled schools is presented first, followed by coach descriptors, and finally the nutrition knowledge of Illinois high school athletic coaches.

Schools

An estimated total of 99 high schools, or 49 percent, responded to the questionnaire. The exact number of schools from which questionnaires were returned was difficult to

calculate for the following reason. Weight requirements for bulk mailing dictate that every out-going questionnaire packet weigh exactly the same amount, so every school had to be sent two self-addressed, stamped return envelopes. However, it was later realized that not all of the schools would have a need to utilize both return envelopes. To further complicate things, the majority of questionnaires which came back did not have return addresses on the envelopes. So it was unknown whether two envelopes were coming from one high school or two separate high schools. Therefore, determining which high schools and how many replied was impossible.

The estimated number of high schools from which responses were received was calculated in the following manner. All of the envelopes which had no return address on them were divided into Class AA and A groups (questionnaires were color coded). It was decided that the majority of schools in the AA group would have a need to use both return envelopes. So, it was calculated that 75 percent of Class AA high schools sent back two return envelopes per high school and 25 percent sent back one envelope per high school. The same calculations were done with the Class A high schools except it was figured that 75 percent of these high schools sent back one return envelope per high school, while 25 percent used both envelopes.

Because the questionnaires were color coded by different geographic locations and school enrollment sizes, the distribution of returns could be calculated. Table 1

represents this distribution of returns.

Table 1.

Distribution of Returns from Illinois High School Athletic Coaches

School Enrollment Size	North (%)	Central (%)	South (%)
A	15	17	7
AA	53	6	2

The distribution of returns from coaches was not surprising since the category which sampled the largest number of high schools was North AA, and South AA was the category which sampled the fewest number of high schools.

Coach Descriptors

A total of 483 coaches returned the questionnaire by the April 3rd deadline. However twelve questionnaires were not usable because less than one-half of the nutrition knowledge questions were completed. Table 2 lists the demographic information about these Illinois high school athletic coaches. They had been coaching from one to 41 years with the average length of time in coaching at 13.1 ± 8.8 years. The age of the coaches ranged from 22 to 65 years old, with a mean age of

Table 2.

Demographic Information About Illinois High School Athletic Coaches

	Overall	Male	Female	>30 years old	≤30	>5 yrs experience	≤5 yrs experience
Number	471	347	101	320	142	345	121
Age (mean yrs) (SD)	38.0 (±9.6)	38.6 (±9.6)	34.1 (±8.2)	42.6 (±7.3)	26.6 (±2.3)	41.3 (±8.1)	27.7 (±5.8)
Experience (mean yrs) (SD)	13.1 (±8.8)	14.0 (±8.9)	9.4 (±6.9)	16.9 (±7.7)	4.1 (±2.3)	16.6 (±7.5)	3.0 (±1.4)

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38.6 years.

Table 3 identifies the teaching responsibilities of the 471 responding Illinois high school athletic coaches. Physical education heads the list with 34 percent of the coaches teaching in this field. Science(14 percent) and math(13 percent) were other subjects frequently taught by the athletic coaches. Twenty other various subjects(not shown on Table 3) were also mentioned, but they were each taught by less than one percent of the coaches.

Coaches from a variety of sports filled out the questionnaire. Table 4 shows the frequency count for each of the sports listed on the questionnaire. The five most frequently mentioned sports were: boys' football, boys' basketball, boys' baseball, boys' track, and girls' basketball. The range of sports coached was from one to six sports, with the majority of coaches(63 percent) reporting that they coached more than one sport.

Table 5 provides data on the sources of nutrition information for the coaches in this study. The questionnaire instructed the coaches to circle all possible sources from which they derived their nutrition information. The data revealed that the most frequently cited source of nutrition information was undergraduate classes. In contrast, Bedgood et al.(1983) found that of the coaches they surveyed, the most frequently listed source of nutrition information was professional journals. Perhaps this discrepancy can be

Table 4.

Frequency Count for Sports Coached by Respondents

Sport	Response Frequency
1. Boys' Football	121
2. Boys' Basketball	102
3. Boys' Baseball	79
4. Boys' Track	76
5. Girls' Basketball	66
6. Girls' Track	59
7. Girls' Softball	48
8. Boys' Wrestling	43
9. Girls' Track	41
10. Boys' Soccer	25
11. Boys' X-Country	25
12. Girls' X-Country	25
13. Girls' Volleyball	24

(table continues)

Table 4. (continued)

Sport	Response Frequency
14. Other	23
15. Boys' Tennis	20
16. Girls' Soccer	20
17. Boys' Golf	17
18. Boys' Swimming	16
19. Girls' Swimming	12
20. Boys' Volleyball	11
21. Girls' Golf	10
22. Girls' Gymnastics	8
23. Girls' Badminton	5
24. Girls' Bowling	5
25. Boys' Ice Hockey	1
26. Boys' Bowling	0

Table 5.

Sources of Nutrition Information for Illinois High School Athletic Coaches

Source	Response Frequency
1. Undergraduate Classes	307
2. Own Athletic Experience	284
3. Professional Journals	257
4. Workshops, Clinics, Conventions	255
5. Other Coaches	209
6. Nutrition Professionals	147
7. Graduate Courses	100
8. Other	46

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explained by the hypothesis that the college courses now taken by prospective athletic coaches may have a greater nutrition component.

Interestingly, but not surprising, the present study revealed that nutrition professionals were not considered a major source of nutrition information. In fact, they were towards the bottom of the list, with only 31 percent identifying them as a source. These data suggest that the relationship between athletic coaches and nutrition professionals needs improvement.

Table 6 represents the respondents likelihood to give advice in different areas of nutrition. Overall, many of the coaches who participated in this study said they provided nutritional advice to their athletes. The category in which the most coaches gave advice in was fluids and hydration(93 percent), while the fewest coaches advised athletes on nutritional supplementation(34 percent).

Both male and female coaches, coaches older than 30 years and coaches younger than 30 years, as well as coaches with greater than 5 years of experience and those with less than 5 years of experience gave similar amounts of advice in all areas, except for the nutritional supplementation category. Though not statistically significant; men, coaches with greater than 5 years of experience, and coaches older than 30 years reported that they give more advice on nutritional supplementation than the other coaches.

Table 6.

Percent of Illinois High School Athletic Coaches Giving Nutritional Advice

Area of Nutrition	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	<5 yrs experience (%)
Fluids & Hydration	93.0	92.8	95.0	92.5	94.4	93.0	92.6
Nutritional Supplementation	34.3	37.2	24.0	36.6	25.4	37.4	23.1
Pre-Competition Meal	82.3	83.2	79.2	83.7	78.2	84.3	75.2
Special Dietary Concerns	47.0	46.9	46.5	46.6	44.4	47.2	42.1
General Nutrition	74.9	75.8	73.3	72.2	78.2	73.6	76.0

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Nutrition Knowledge

Table 7 shows the average nutrition knowledge scores for all coaches by the different geographic locations and school enrollment sizes. An analysis of variance was performed to determine if there were any statistically significant differences in the overall nutrition knowledge scores between the six different geographic locations and school enrollment sizes. There were no significant differences found in the overall nutrition knowledge scores between the six categories. Therefore, all further analysis of data will describe the entire state of Illinois.

Table 8 lists the mean scores for all of the nutrition knowledge categories. The mean overall nutrition knowledge score was 15.3 out of a possible 20.0, or 76 percent correct. Only 4.5 percent of the coaches scored below 50 percent on the nutrition knowledge questions, while 34.4 percent scored above 80 percent.

T-tests were calculated to determine if there were any statistically significant differences in the nutrition knowledge scores between selected paired comparisons. Males were compared to females, coaches older than 30 years to coaches younger than 30 years, and coaches with greater than 5 years of experience to coaches with less than 5 years of experience.

Years of coaching experience was the only comparison in

Table 7.

Nutrition Knowledge Mean and Standard Deviation Scores for Coaches by Geographic Location and School Enrollment Size

Category (Maximum Possible Score)	North		Central		South		North		Central		South	
	AA	AA	AA	AA	AA	AA	A	A	A	A	A	A
Overall Nutrition Knowledge (20)	15.4 (±2.7)	14.7 (±2.0)	15.7 (±1.8)	15.2 (±2.6)	14.9 (±2.7)	15.2 (±2.6)	14.9 (±2.7)	15.2 (±2.6)	14.9 (±2.7)	15.2 (±2.6)	14.9 (±2.7)	16.2 (±1.9)
Fluids & Hydration (4)	3.3 (±0.8)	3.0 (±0.9)	3.5 (±0.7)	3.3 (±0.5)	3.2 (±0.7)	3.5 (±0.7)	3.2 (±0.7)	3.3 (±0.5)	3.2 (±0.7)	3.3 (±0.5)	3.2 (±0.7)	3.4 (±0.6)
Nutritional Supplementation (4)	2.9 (±1.1)	2.6 (±1.0)	2.9 (±0.9)	2.9 (±1.0)	2.8 (±1.1)	2.9 (±0.9)	2.8 (±1.1)	2.9 (±1.0)	2.8 (±1.1)	2.9 (±1.0)	2.8 (±1.1)	3.1 (±1.1)
Pre-Competition Meal (3)	2.7 (±0.5)	2.8 (±0.5)	2.5 (±0.5)	2.8 (±0.5)	2.6 (±0.6)	2.5 (±0.5)	2.6 (±0.6)	2.8 (±0.5)	2.6 (±0.6)	2.8 (±0.5)	2.6 (±0.6)	2.6 (±0.5)
Special Dietary Concerns (5)	4.0 (±0.8)	3.7 (±0.9)	4.1 (±0.6)	3.9 (±1.0)	3.9 (±1.0)	4.1 (±0.6)	3.9 (±1.0)	3.9 (±1.0)	3.9 (±1.0)	3.9 (±1.0)	3.9 (±1.0)	4.1 (±0.8)
General Nutrition (4)	3.1 (±0.8)	3.3 (±0.7)	3.2 (±0.8)	3.1 (±0.8)	2.9 (±0.9)	3.2 (±0.8)	2.9 (±0.9)	3.1 (±0.8)	2.9 (±0.9)	3.1 (±0.8)	2.9 (±0.9)	3.2 (±0.8)

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Table 8.

Nutrition Knowledge Mean and Standard Deviation Scores for Illinois High School Athletic

Coaches

Category (Maximum Possible Score)	Overall	Male	Female	>30 years old	≤30 years old	>5 yrs experience	<5 yrs experience
Overall Nutrition Knowledge (20)	15.3 (±2.6)	15.3 (±2.5)	15.4 (±2.6)	15.3 (±2.5)	15.3 (±2.6)	15.4 (±2.4)	15.2 (±2.9)
Fluids & Hydration (4)	3.3 (±0.7)	3.3 (±0.7)	3.2 (±0.7)	3.3 (±0.7)	3.3 (±0.8)	3.2 (±0.7)	3.3 (±0.8)
Nutritional Supplementation (4)	2.9 (±1.1)	2.9 (±1.1)	2.9 (±1.0)	2.9 (±1.1)	2.9 (±1.0)	2.9 (±1.1)	2.8 (±1.0)
Pre-Competition Meal (3)	2.7 (±0.9)	2.7 (±0.9)	2.7 (±0.8)	2.7 (±0.9)	2.6 (±0.9)	2.7* (±0.9)	2.6 (±0.9)
Special Dietary Concerns (5)	4.0 (±0.8)	4.0 (±0.9)	4.0 (±0.7)	4.0 (±0.9)	4.0 (±0.9)	4.0 (±0.9)	4.0 (±0.9)
General Nutrition (4)	3.1 (±0.8)	3.1 (±0.9)	3.2 (±0.7)	3.1 (±0.8)	3.1 (±0.8)	3.1 (±0.8)	3.1 (±0.8)

* Note: 2.7 is, at the .05 level of confidence, significantly greater than 2.6

which a statistically significant difference appeared. The score(2.7) in the pre-competition meal and composition category by the coaches with more than 5 years of experience was significantly higher(.05 level of confidence) when compared to the score(2.6) achieved by the coaches with less than 5 years of experience.

Fluids and Hydration

The average score in this subsection was 3.25 out of a possible 4.00, or 81 percent correct. The percentage of correct responses in the fluids and hydration section in the current study was higher than the 70 percent which was reported by Bedgood et al.(1983).

Table 9 shows which questions were included in the fluids and hydration category and the respective percentage of correct responses. This investigation revealed that 95 percent of the high school coaches recognized the need for fluids frequently during practice and competition. Back in 1979, Bentivegna et al. found that 70 percent of the coaches and trainers they studied provided water during practice sessions or events. The continued increase in the number of coaches who provide fluids during practices and competitions reflects a reversal of the water deprivation philosophy practiced for many years.

The question that the majority of coaches struggled with in this section dealt with the carbohydrate concentration in

Table 9.

Fluids and Hydration Questions and the Percent of Correct Responses

Question # (Concept)	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	≤5 yrs experience (%)
#02 (Dehydration)	71.5	72.6	71.3	71.9	70.4	71.9	71.1
#07 (Hydration)	95.1	94.8	97.0	94.7	95.8	95.4	94.2
#11 (Fluid replacement)	92.6	92.8	94.1	92.8	91.5	92.8	91.7
#16 (Sports drinks)	52.7	53.9	46.5	52.8	54.2	54.5	47.9

APR 1978

sports drinks. Forty-seven percent of the coaches incorrectly agreed that the optimal concentration of carbohydrate in sports drinks is greater than 10 percent. In a book titled Food Power: A Coaches Guide to Improving Performance (National Dairy Council, 1991) it is stated that drinks which exceed 10 percent sugar (soft drinks and undiluted fruit juices) can adversely affect an athlete's performance by causing cramps, nausea, and diarrhea.

Nutritional Supplementation

Coaches had the lowest average score on these questions; 2.87 out of a possible 4.00, or 72 percent correct. Fortunately, this was also the category in which the coaches reportedly dispensed the least amount of advice.

Table 10 lists the nutrition supplementation questions and the percent of correct responses for this category. Coaches were least familiar with the fact that excessive use of protein supplements can lead to dehydration, with just 58 percent of the coaches correctly responding. Thirty-one percent and 33 percent, respectively, incorrectly thought that vitamins are a source of energy for athletes and a vitamin/mineral supplement is essential for most athletes. Corley et al. (1990) indicated that 60 percent of the coaches they studied recommended vitamin/mineral supplements. Parr et al. (1984) states that there is no supportive evidence that an athlete's performance is enhanced by vitamin supplements. He

Table 10.

Nutritional Supplementation Questions and the Percent of Correct Responses

Question # (Concept)	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	≤5 yrs experience (%)
#03 (Amino acids)	77.3	77.8	74.3	74.7	83.8	76.2	79.3
#13 (Vitamins)	69.2	70.6	65.3	73.7	59.2	72.8	58.7
#14 (Protein)	58.4	56.8	66.3	56.9	61.3	58.3	57.9
#19 (Vitamin/ mineral)	64.3	65.1	63.4	62.8	69.0	63.2	68.6

RESEARCH AND DEVELOPMENT

further stated that the primary opposition to supplements is not their ineffectiveness but that athletes may tend to justify their poor eating habits by supplementing their diets with vitamins, minerals, and protein. Poor eating habits combined with dietary supplements are common in athletes, especially those attempting to lose weight during training.

Studies such as the one done by Bentivegna et al. (1979) suggest that the majority of coaches believe that protein is the most important factor in increasing muscle mass. However, in the present study, 77 percent of the coaches did not agree that amino acid supplements are essential to increase muscle mass. It seems that the emphasis on protein as the primary factor for increasing muscle mass has diminished over the years.

The Pre-Competition Meal and Composition

The coaches achieved the highest overall score in this subsection, with an average score of 2.68 out of a possible 3.00, or 89 percent correct. Even though the score (2.7) in the pre-competition meal and composition category by the coaches with more than 5 years of experience was significantly higher (.05 level of confidence) when compared to the score (2.6) achieved by the coaches with less than 5 years of experience, the difference was small and probably has little practical significance.

The vast majority of coaches (greater than 80 percent)

responded appropriately to all three questions in this section. Table 11 represents pre-competition meal questions and the percent of correct responses in this category. The subjects were knowledgeable about the timing (95 percent) and the composition (89 percent) of the pre-competition meal, as well as, the fact that the majority of energy for competition does not come from the pre-competition meal (81 percent). The results of this investigation correlate with the findings of Bedgood et al. (1983). Both studies report that 89 percent of the coaches responded correctly concerning the restriction of fat content in the pre-competition meal.

Special Dietary Concerns

The mean overall score in this subsection was 3.97 out of a possible 5.0, or 79 percent correct. Table 12 lists the special dietary concerns questions and the percent of correct responses in this category.

The most frequently missed question dealt with carbohydrate loading. Thirty-seven percent of the coaches failed to realize that carbohydrate loading will not enhance performance in sprinting events. Corley et al. (1990) reported that 68 percent of the coaches they studied did not recognize the ineffectiveness of carbohydrate loading for athletic events lasting less than one hour.

In the present study, 66 percent of the coaches knew that an athlete may have greater iron requirements than what is

Table 11.

Pre-Composition Meal and Composition Questions and the Percent of Correct Responses

Question #	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	≤5 yrs experience (%)
(Concept)							
#05 (Energy)	81.1	82.1	77.2	74.7	74.6	85.5	67.8
#10 (Timing)	95.1	95.4	94.1	95.3	95.1	95.1	95.0
#15 (Composition)	88.7	89.0	88.1	89.4	88.7	89.0	87.6

Table 12.

Special Dietary Concerns Questions and the Percent of Correct Responses

Question # (Concept)	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	≤5 yrs experience (%)
#01 (Body weight)	98.5	98.0	100.0	98.7	97.9	98.0	100.0
#04 (Iron)	66.2	67.4	61.4	63.1	73.9	64.6	71.1
#06 (Eating disorders)	69.9	66.3	82.2	70.9	68.3	71.6	64.5
#09 (Carbohydrate loading)	63.1	65.7	55.4	64.7	59.9	63.5	62.0
#17 (Vegetarian diets)	86.8	85.9	91.1	84.4	91.5	86.4	87.6

recommended for the general population. This is because iron is lost from sweating, red blood cells are destroyed during weight bearing exercise, and iron absorption is decreased as a result of exercise (National Dairy Council, 1991). Wolf et al. (1979) concluded that iron deficiency is found amongst all athletes, but is more common in females and in sports requiring low body weight and/or body fat. Further, because iron deficiency results in a lower hemoglobin concentration, and therefore, a decrease in the oxygen-carrying capacity of the blood, it is logical to expect that performance may be affected in athletic events requiring high cardiorespiratory endurance. Consequently, coaches need to monitor the dietary intake of their endurance athletes, especially females and those athletes who are trying to lose weight.

Ninety-nine percent of the coaches in this investigation recognized that the use of objective body measurements, such as skinfolds, circumference, and body width, provide a more useful index of body fatness than body weight alone or eye appraisal. However, Wolf et al. (1979) found that only 24 percent of the coaches in the Big Ten Athletic Conference use objective body measurements such as the ones described above.

General Nutrition

The average score for this subsection was 3.10 out of a possible 4.00, or 78 percent correct. Bedgood et al. (1983) similarly reported that coaches scored above average in the

general nutrition category.

Table 13 shows general nutrition questions and the percent of correct responses for the respective questions. Eighty-five percent of the coaches knew that muscle breakdown can occur as a result of rapid weight loss and that carbohydrates are the most important nutrient in a training diet. On the other hand, coaches struggled with the fact that carbohydrates are the major fuel source for anaerobic exercises, with only 58 percent responding correctly.

Table 13.

General Nutrition Questions and the Percent of Correct Responses

Question # (Concept)	Overall (%)	Male (%)	Female (%)	>30 years old (%)	≤30 years old (%)	>5 yrs experience (%)	≤5 yrs experience (%)
#08 (Calories)	69.4	68.6	72.3	69.4	69.0	70.7	65.3
#12 (Muscle breakdown)	85.1	84.7	88.1	83.4	89.4	84.3	87.6
#18 (Training diet composition)	85.4	86.2	82.2	87.8	80.3	87.0	80.2
#20 (Energy sources)	58.0	55.6	65.3	55.9	60.6	56.8	61.2

CHAPTER V

SUMMARY

A survey of Illinois high school athletic coaches was performed in an attempt to determine their nutrition knowledge. A cover letter and a questionnaire were sent to the athletic director of 203 randomly sampled high schools from different geographic locations and school enrollment sizes, as listed in the 1994 Illinois High School Association Member School Directory.

Questionnaire items were designed to determine the coaches' age, gender, years of coaching experience, sport(s) coached, teaching responsibilities, source of nutrition information, and whether they gave nutrition advice to their athletes. The nutrition knowledge questions addressed topics such as fluids and hydration, nutritional supplementation, the pre-competition meal and composition, special dietary concerns, and general nutrition.

The major finding of this investigation was that Illinois high school athletic coaches averaged 76 percent correct for overall nutrition knowledge. Only 4.5 percent of the coaches scored below 50 percent correct, while one-third of the coaches scored greater than 80 percent correct. Though it is

hard to compare the degree of difficulty between questionnaires from various studies, it appears that the athletic coaches in the present study showed superior knowledge.

Within the individual subsections, the highest score, 89 percent, was in the pre-competition meal and composition category. The lowest score, 72 percent, occurred in the nutritional supplementation category.

An analysis of variance and t-tests were performed to determine if there were any statistically significant differences in the nutrition knowledge scores by geographic location and school enrollment size, and also between selected paired comparisons (male-female, older-younger, experience-inexperience). The only comparison in which a statistically significant difference was found occurred when those with greater than 5 years of coaching experience demonstrated superior knowledge in the pre-competition meal and composition category.

This investigation also revealed other important information about Illinois high school athletic coaches. The most frequently reported teaching responsibility was in physical education. Science and math were the second and third most frequently mentioned faculty positions.

Coaches in this study stated that undergraduate classes were the leading source of their nutrition information. One's own athletic experience and professional journals were other

top sources of nutrition information. Nutrition professionals were not considered, by these respondents, a major source of nutrition information.

Many of the coaches reported that they give nutrition advice to their athletes. The coaches most frequently gave advice on fluids and hydration(93 percent). The area in which coaches were hesitant about giving advice was in nutritional supplementation(34 percent).

Recommendations

Upon examination of the findings from this study it was learned that physical education was the teaching responsibility most frequently mentioned by athletic coaches and that undergraduate classes were the leading source of nutrition information listed by the coaches.

With this knowledge it becomes imperative that at the college level the nutrition professionals work in cooperation with physical education and athletics professionals to provide the necessary training in nutrition as applied to athletics. The first step might be to have a basic nutrition course as a requirement for a Bachelor's degree in Physical Education. Within this course, it would then be the responsibility of nutrition professional to translate for aspiring coaches the basic principles of nutrition as they relate to athletic performance.

It was also learned that athletic coaches do not view nutrition professionals as a major source of nutrition information. Therefore, it is up to nutrition professionals to make themselves more visible in the athletic arena and prove to athletic coaches that they can be valuable asset. This could be accomplished by conducting nutrition education workshops and seminars which emphasize the interrelationships of nutrition and athletic performance.

Once there is trust and communication between athletic coaches and nutrition professionals, then they will be able to work hand in hand to deliver correct nutrition education messages to athletes. The presence of nutrition professionals can provide support personnel for coaches who typically do not have formal training in nutrition.

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APPENDIX A: COVER LETTER

February 25, 1995

Dear Athletic Director,

I am a registered dietitian and graduate student at Eastern Illinois University working on my masters thesis and am in need of your help. I was hoping with your influence, the coaches at your school would respond to the enclosed nutrition questionnaire. The purpose of my study is to assess the nutrition beliefs of high school coaches in order to identify the specific areas of nutrition that high school coaches struggle with the most. This information will help nutrition professionals in the development of nutrition education programs for coaches.

Random high schools throughout the state of Illinois have been sent this questionnaire. In no way will the identity of your school or coaches be revealed in this study. Confidentiality is of utmost importance.

Please distribute a questionnaire to each coach on your staff. If you have more than 15 coaches, please photocopy the questionnaire so every coach has the opportunity to respond. Give the coaches approximately one week to complete the questionnaire and return to you. Please send back all of the completed questionnaires, before March 20th, in the self-addressed stamped return envelope(s) provided.

Thank you very much,

Donall Hausauer, R.D., B.S.

Note: Donall is attempting a very worth while project. We would very much appreciate it if you would help us out by following the procedure described above. She must have returns by March 20th in order to meet her thesis deadlines. Thanks for considering this request.

M. Thomas Woodall, Ph.D
Director - Human Performance Lab

APPENDIX B: EVALUATION FORM

Dear Evaluators,

I am constructing a questionnaire for my masters thesis that will assess the overall nutrition knowledge of high school coaches in the state of Illinois. Attached are an evaluation form, concept statements and questions. Please evaluate the 20 concept statements and questions using the following procedure:

1. Answer all of the questions with either AGREE or DISAGREE. (Questions are in "quotes") (Column 2).
2. Indicate whether you consider the concept statement to be an important sports nutrition statement (Column 3).
3. Determine if the question is really assessing the concept statement (Column 4).
4. Make comments on concept statements or questions that need to be rewritten (Column 5).
5. Have all of the important areas in sports nutrition been addressed? Please specify specific areas, if any, that you feel were not addressed and should be (Bottom of form).

Thank you for taking the time to evaluate these questions-- Your input is very much appreciated. I will pick up the evaluation forms on Friday afternoon, Feb. 24th.

Thanks again,

EVALUATION FORM

<u>QUESTION</u>	<u>A OR D WITH QUESTION</u>	<u>CONCEPT STATEMENT IMP OR NOT IMP</u>	<u>DOES QUESTION ASSESS CONCEPT STATEMENT</u>	<u>COMMENTS</u>
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____
5	_____	_____	_____	_____
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____
9	_____	_____	_____	_____
10	_____	_____	_____	_____
11	_____	_____	_____	_____
12	_____	_____	_____	_____
13	_____	_____	_____	_____
14	_____	_____	_____	_____
15	_____	_____	_____	_____
16	_____	_____	_____	_____
17	_____	_____	_____	_____
18	_____	_____	_____	_____
19	_____	_____	_____	_____
20	_____	_____	_____	_____

HAVE ALL OF THE IMPORTANT AREAS IN SPORTS NUTRITION BEEN
 ADDRESSED? YES NO
 IF NO, PLEASE SPECIFY _____

FLUIDS AND HYDRATION

1. During exercise the body's thirst mechanism lags behind actual need.

"Athletes can rely on thirst to ensure adequate fluid replacement during and after competition."

2. Sports drinks with a higher carbohydrate content (>10%) can delay the absorption of water, possibly causing cramps, nausea and diarrhea.

"The optimal concentration of carbohydrate in sports drinks is 10-12%."

3. A reliable indicator of how much water you need is your weight. Each pound of weight lost as sweat is equal to 2 eight ounce glasses of water.

"An athlete should consume 2 eight ounce glasses of water for every pound of weight lost as sweat."

4. For rapid fluid replacement, a drink should be cool to the touch and consumed in moderate amounts frequently during competition.

"Athletes should be advised to drink moderate amounts of cool fluids frequently during competition."

NUTRITIONAL SUPPLEMENTATION

5. There is no concrete evidence that amino acid supplements will effectively increase muscle mass or decrease body fat in otherwise healthy athletes.

"Amino acid supplements are essential to increase muscle mass and decrease body fat."

6. Most athletes can get all the vitamins and minerals they need by eating a well balanced diet.

"A vitamin/mineral supplement is essential for most athletes."

7. Carbohydrate loading is effective only when used by well-trained, endurance athletes involved in events lasting 90 minutes or longer.

"Carbohydrate loading will enhance performance in sprinting events such as the 400 meter dash."

8. Dehydration can result from the excessive use of protein supplements.

"Excessive use of protein supplements can lead to dehydration."

PRE-COMPETITION MEAL

9. Energy for competition comes from glycogen and fat deposits stored prior to competition.

"Most of the athletes' energy for competition comes from the pre-competition meal."

10. A good pre-competition meal should be moderately high in carbohydrate and low in fat.

"Steak and potatoes is considered a good pre-competition meal."

11. The pre-competition meal should be eaten 1-4 hours before the event, thus, allowing the stomach to be relatively empty during the event.

"Athletes are advised to eat a meal 1/2 hour before competition."

SPECIAL DIETARY CONCERNS

12. An athlete's iron needs may be higher as a result of exercise.

"Exercise itself may increase an athlete's need for iron."

13. Weight loss, faster than one to two pounds a week, may result in the break down of muscle.

"Not considering water loss, weight loss faster than 2 pounds per week may result in muscle breakdown."

14. Vegetarian diets which omit food groups (e.g. meat group and milk group) may be lacking in nutrients that only these food groups can adequately supply.

"Athletes following vegetarian diets that omit food groups, such as the meat and/or milk group, may need to supplement nutrients such as calcium, iron, or vitamin B₁₂."

15. Coaches and athletes should consider body composition and percent body fat when establishing an ideal competitive weight.

"Body weight alone should be the primary factor used to determine if an athlete is at an ideal competitive weight."

16. Coaches can suspect eating disorders when the following signs are present: An athlete repeatedly disappears immediately after eating and participation in excessive physical activity which is not part of the training regimen.

"Participation in excessive physical activity which is not part of the training regimen and repeatedly disappearing immediately after eating are each signs of a possible eating disorder."

GENERAL NUTRITION

17. Intense endurance training depletes muscle glycogen, therefore, a high carbohydrate diet is desirable.

"During endurance training an athletes diet should be rich in protein and low in carbohydrates."

18. Anaerobic exercises utilize glucose and glycogen as a primary fuel source.

"Exercises like the 400 meter dash and 100 yard swim use carbohydrates as the major fuel source."

19. Carbohydrate, fat, and protein provide athletes with the energy they need for exercise.

"Vitamins are a source of energy for athletes."

20. Carbohydrates and protein contain 4 calories per gram, while fat contains 9 calories per gram.

"Fat contains twice as many calories per gram as carbohydrates and protein."

APPENDIX C: EVALUATION COMMENTS

<u>QUESTION</u>	<u>CONCEPT STATEMENT IMP OR NOT IMP</u>	<u>DOES QUESTION ASSESS CONCEPT STATEMENT</u>	<u>COMMENTS</u>
1	8 YES	8 YES	
2	8 YES	8 YES	
3	8 YES	8 YES	
4	8 YES	8 YES	
5	8 YES	8 YES	Some evidence that 2.0 g/kg can increase muscle mass
6	8 YES	8 YES	
7	8 YES	8 YES	
8	6 YES 2 NO	8 YES	Is dehydration the biggest problem
9	8 YES	7 YES 1 NO	Do not want to infer pre- competition meal is not important
10	8 YES	7 YES 1 NO	Question needs rewording
11	8 YES	8 YES	
12	7 YES 1 NO	8 YES	Important only for females
13	8 YES	6 YES 2 NO	Question needs rewording
14	8 YES	7 YES 1 MAYBE	Well planned vegetarian diet may meet needs

<u>QUESTION</u>	<u>CONCEPT STATEMENT IMP OR NOT IMP</u>	<u>DOES QUESTION ASSESS CONCEPT STATEMENT</u>	<u>COMMENTS</u>
15	8 YES	8 YES	
16	8 YES	8 YES	
17	8 YES	2 YES 6 NO	Need to specify high protein What kind of training
18	7 YES 1 NO	7 YES 1 NO	All exercise longer than a few seconds uses carbohydrates as a fuel
19	7 YES 1 NO	5 YES 3 NO	Concept not specific enough Question complex
20	7 YES 1 NO	5 YES 3 NO	May not understand the relationship to weight

APPENDIX D: QUESTIONNAIRE

NUTRITION BELIEFS QUESTIONNAIRE FOR COACHES

Donall Hausauer Eastern Illinois University Human Performance Lab

Dear Coach,

My advisor(Dr. Tom Woodall) and I are gathering data on the nutritional beliefs of high school coaches. Please take a few minutes out of your already hectic schedule to answer this questionnaire and help me with my masters thesis. Please return the completed questionnaire to your athletic director within one week so that your responses can be mailed to me by my March 20th deadline. Thank you very much, Donall Hausauer, B.S.

SECTION A Circle the number of the appropriate response(s), or fill in the blank for each of the following items.

1. Coaching experience(years): _____ 2. Your age(years): _____

3. If you teach in addition to coaching, please indicate what subject area(s): _____

4. Do you have teacher certification? 1. Yes 2. No If Yes, in what area? _____

5. Your gender: 1. Male 2. Female

6. Circle the sport(s) you coach(circle all that apply):

- | | | | |
|----------------------|----------------------|-----------------------|-----------------------|
| 01. Boy's Baseball | 07. Boy's Soccer | 13. Boy's X-Country | 19. Girl's Soccer |
| 02. Boy's Basketball | 08. Boy's Swimming | 14. Girl's Badminton | 20. Girl's Softball |
| 03. Boy's Bowling | 09. Boy's Tennis | 15. Girl's Basketball | 21. Girl's Swimming |
| 04. Boy's Football | 10. Boy's Track | 16. Girl's Bowling | 22. Girl's Tennis |
| 05. Boy's Golf | 11. Boy's Volleyball | 17. Girl's Golf | 23. Girl's Track |
| 06. Boy's Ice Hockey | 12. Boy's Wrestling | 18. Girl's Gymnastics | 24. Girl's Volleyball |
| Other: _____ | | | 25. Girl's X-Country |

7. From what sources have you obtained your nutrition information? (Circle all that apply)

- | | |
|--|----------------------------|
| 1. Undergraduate courses
(eg. nutrition, athletic training, or exercise physiology classes) | 5. Graduate Courses |
| 2. Professional journals | 6. Other coaches |
| 3. Workshops, Clinics, Conventions | 7. Own athletic experience |
| 4. Nutrition professional(s) | 8. Other: _____ |

8. Do you give athletes nutrition advice in the following areas?(Circle Yes or No for each area)

- | | | |
|--|--------|-------|
| Fluids and hydration (eg. fluid intake, sports drinks) | 1. Yes | 2. No |
| Nutrition supplements (eg. vitamin/mineral, protein/amino acid supplements) | 1. Yes | 2. No |
| Precompetition meal (eg. content, timing of meal) | 1. Yes | 2. No |
| Special dietary concerns (eg. weight loss, veg. diets, carbohydrate loading) | 1. Yes | 2. No |
| General nutrition (eg. fuels for exercise, training diet composition) | 1. Yes | 2. No |

SECTION B Circle the response that best represents what you think about each of the following statements.

AGREE **DISAGREE**

- | | | |
|---|---|--|
| 1 | 2 | 1. Body weight alone should be the primary factor used to determine if an athlete is at an ideal competitive weight. |
| 1 | 2 | 2. Athletes should consume 2 eight ounce glasses of water for every pound of weight lost as sweat. |
| 1 | 2 | 3. Amino acid supplements are essential to increase muscle mass and decrease body fat. |
| 1 | 2 | 4. Exercise itself may increase an athlete's need for iron. |
| 1 | 2 | 5. Most of the athletes' energy for competition comes from the pre-competition meal. |
| 1 | 2 | 6. Participation in excessive physical activity which is not part of the training regimen and repeatedly disappearing immediately after eating are each signs of a possible eating disorder. |
| 1 | 2 | 7. Athletes should be advised to drink moderate amounts of fluids frequently during competition. |
| 1 | 2 | 8. Fat contains twice as many calories per gram as carbohydrates and protein. |
| 1 | 2 | 9. Carbohydrate loading will enhance performance in sprinting events such as the 400 meter dash. |
| 1 | 2 | 10. Athletes are advised to eat a meal 1/2 hour before competition. |
| 1 | 2 | 11. Athletes can rely on thirst to ensure adequate fluid replacement during and after competition. |
| 1 | 2 | 12. Not considering water loss, weight loss faster than 2 pounds per week may result in muscle breakdown. |
| 1 | 2 | 13. Vitamins are a source of energy for athletes. |
| 1 | 2 | 14. Excessive use of protein supplements can lead to dehydration. |
| 1 | 2 | 15. Steak and potatoes is considered a good pre-competition meal. |
| 1 | 2 | 16. The optimal concentration of carbohydrate in sports drinks is greater than 10%. |
| 1 | 2 | 17. Athletes following vegetarian diets that omit food groups, such as the meat and milk groups, may need to supplement nutrients such as calcium, iron, or vitamin B ₁₂ . |

- 1 2 18. During endurance training, an athletes diet should be rich in protein and low in carbohydrates.
- 1 2 19. A vitamin/mineral supplement is essential for most athletes.
- 1 2 20. Exercises like the 400 meter dash and 100 yard swim use carbohydrates as the major fuel source.