The purpose of the present investigation was to determine the level of nutrition knowledge and degree of competitiveness in high school wrestlers and their coaches and to look at the differences between groups. Twelve schools participated in the study and a total of 180 wrestlers and 29 coaches (12 head and 17 assistant) completed the nutrition knowledge and Sports Orientation (competitiveness) questionnaires. The results indicate that nutrition knowledge increases significantly with increasing age or grade level in the athletes (p=0.0001), but significant increases were not seen for each year. The mean score for nutrition knowledge was 53.9% for the athletes and 67% for the coaches, both very low scores overall when compared with previous research, indicating a strong need for improved nutrition education in both populations. The coaches' mean nutrition knowledge levels were found to increase significantly with increasing years of coaching (p=0.0001), suggesting that some knowledge is gained through experience. Team nutrition scores varied significantly, with a range of 50 to 63%, suggesting that some schools may have higher quality nutrition education programs than others. Results of the nutrition knowledge scores also demonstrate that a significant similarity exists between the head coaches' nutrition score and the teams' mean score (p=0.0001), suggesting the possibility that the head coaches can have a greater impact on their teams' level of nutrition information than can other possible sources.

Competitiveness scores were very high for this population as compared to previous studies completed with high school students, with the mean scores being 58.5 out of a possible 65 points for the wrestlers, and 59.4 for the coaches. Average competitiveness scores previously seen in the high school athletic population are approximately 20% lower than the scores found in these wrestlers, with a mean of 47. Competitiveness was found to significantly increase with increasing years of participation
in wrestling \((p=.02)\), but no other significant interrelationships were found to exist with regard to competitiveness levels in this population.

There are many factors that were unable to be researched in this study due to inconsistent weight records that were to be kept by each team. Not 1 of the 12 schools kept consistent nor complete weight records throughout the season, making much of the planned research impossible.

In conclusion, there exists much speculation regarding the possible consequences of weight cutting during adolescence, especially when the perceived benefits of the practice are not scientifically based. Research has suggested that there are many changes that need to be considered within the sport of wrestling such as minimal weight standards along with strict enforcement of those standards. As demonstrated with the results of this study, nutrition knowledge is low in the wrestling population, wrestlers and coaches alike, and therefore, additional education regarding nutrition and unsafe weight loss practices in high-risk populations such as the high school wrestler is needed.
Nutrition Knowledge and Competitiveness:
Interrelationships in High School
Wrestlers and Their Coaches

by

Patricia A. Fahlstrom-Nopp

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Patricia A. Fahlstrom-Nopp, Author
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I. Introduction

The practice of weight cutting is widely used by wrestlers throughout the United States in order to gain a competitive edge over the opponent. Weight cutting or cycling has been defined as repeated cycles of weight loss and gain throughout an athletic season. In the sport of wrestling, the athletes often must compete at weights far below their natural weight, and the amount of weight lost for a match can vary from 0.5 up to 21 pounds (1), and with some athletes, the losses may be even more severe. There has been an increasing interest in the practice of weight cutting within the last three decades, and there exists much concern among many of the groups involved in the health and fitness area due to the potential negative long-term effects of repeated and rapid weight loss. The American College of Sports Medicine (ACSM) and the American Medical Association (AMA) have both issued position statements that strongly discourage the severe food and fluid restrictions that many competing wrestlers continue to practice (Appendix 1) (2).

There appear to be two primary reasons for the continued use of weight cutting in the sport of wrestling. Many wrestlers use weight cutting as a form of both physical and psychological preparation for competition, and many of the wrestlers believe that weight cutting for each important match is required in order to perform at their best (1). Another reason for this continued practice seems to stem from a lack of understanding regarding the potential consequences of rapid and repeated weight loss.

Many of the common practices that wrestlers follow in order to "make weight" for a match, such as food and fluid deprivation, may stem from a general lack of nutrition knowledge (3). A number of studies have looked at the levels of nutrition knowledge in coaches, athletes, athletic trainers, and parents involved in various sports (3,4,5,6,7), and the majority have found that the nutrition
backgrounds and levels of nutrition knowledge are typically low in most of these
groups. Many athletes look to their coaches, parents, and peers for primary
nutrition information regarding healthy food choices and proper weight control, but
studies show that neither the coaches nor the parents are often as current in
these topics as they could be (3). Many coaches base their information on
personal experience and their own athletic experiences from past decades rather
than on current medical or nutritional research available (4).

Due to the severity of weight cutting practiced by some athletes, and the
potential negative effects of this practice on the health and performance of the
athletes (8), it is vital that coaches and athletic trainers, especially those working
with growing children and adolescents, realize the importance of a healthy diet.
Parents also need to remain well informed regarding health matters when a child
is participating in sports, especially sports that may require body composition
changes throughout the seasons.

Little is known regarding the relationship between an athlete's level of
competitiveness and the severity of weight cutting practiced, and therefore, one
of the goals of this project was to determine whether or not there is a potential
relationship between these two factors. Competitiveness is hypothesized to be a
variable that may influence the amount of weight cycling and cutting in high
school wrestlers due to the fact that much of what makes wrestling such an
intense sport is the mental toughness that is necessary. Competition in a sport
such as wrestling requires preparation both physically and psychologically, and
the athletes often try to "psych" each other out with comments and actions in
order to gain the competitive edge.

The primary hypotheses of this study were the following:
1. the average nutrition knowledge scores of the wrestling teams will be higher if
   their coaches scores are higher.
2. the average competitiveness scores of the wrestling teams will be higher if
   their coaches scores are higher.
3. other variables such as age, years in competition, and place in district will increase the competitiveness and nutrition knowledge scores of the athletes.
4. teams with higher competitiveness levels will have higher win/loss records and a higher placement in district.
5. a higher level of competitiveness and a lower level of nutrition knowledge will increase the severity of weight cutting in the wrestlers.

Operational definitions:
1. Nutrition knowledge: the level of knowledge regarding nutrition information. This is determined by the score received on the questionnaire. (See appendix 2).
2. Competitiveness: the level of sports oriented competitiveness regarding competition situations. This is determined by the scoring of the Sports Orientation Questionnaire. (See appendix 2).
3. Weight cutting or cycling: the practice of repeated cycles of weight loss and regain throughout a competitive season. This will be measured through the analysis of weight records kept by the wrestling teams.

Assumptions of the study include that the two questionnaires utilized to measure nutrition knowledge and competitiveness will accurately measure the intended variables, and that each participant has answered the questions honestly.

Delimitations of this study include the following:
1. only high school wrestling teams are included
2. only wrestling teams from the Willamette Valley schools in Oregon are included
3. only wrestling teams from AAAA schools, which are the largest schools in Oregon, are included
4. only one competitive season was studied.
5. only self-reported weights were sought
II. Review of Literature

Reasons for Weight Cutting in Wrestling

Weight cycling has been defined as repeated cycles of weight loss and gain, and the sport of wrestling is only one of a number of sports in which the athletes may practice weight cycling or cutting. Some of the athletes are primarily concerned about appearance, such as dancers and gymnasts, and other athletes are more concerned about the effect of excess weight on performance, such as runners and swimmers (9).

When one thinks of sports and weight cycling, often the first group of athletes that come to mind are wrestlers, and this is due to the fact that a great amount of interest has been expressed regarding the practices used by these athletes to "make weight" for matches. Wrestlers often restrict food and fluid intake to qualify to wrestle in a weight classification that is below their natural weight (9). This drop in weight classes is thought to occur for several reasons. First, many athletes and their coaches believe that weight cutting before an event is advantageous due to the fact that the "cut" wrestler may be wrestling a smaller opponent, or one that has not cut to meet the weight restriction. Coaches and wrestlers believe that this can provide an advantage in leverage and strength. Second, the weights of the athletes tend to cluster in the middle weight categories, and therefore there is higher competition for these positions between the athletes on each team. For this reason, some wrestlers will find it necessary to drop at least one weight class in order to make the team. Third, a wrestler may find himself on a team that has stronger athletes in certain weight classes, and therefore, he must drop into another weight class in order to compete on the team (9).

Many people have asked why the weight class system is still being utilized since so many groups have expressed concern over the repeated weight cutting in athletes, and the answer is simply that there is no better control system yet developed. The weight class system was designed for the protection of the
competing athletes by reducing the risk of injury to competitors by eliminating large differences in size and strength, and to allow athletes of all sizes and abilities to compete on an equal level (10). The problem with the weight class system arises when athletes choose to reduce their weight in order to gain entrance into a lower weight class in hopes of achieving advantages in strength, power, and leverage over an opponent who does not cut weight for the same weight class. The most obvious barrier that needs to be overcome with regard to the current weight class system is that the majority of the high school wrestlers fall into 3 of the 13 weight classes (115, 123, & 136 pound classes), creating increased competition for these weight class positions.

In a study by Tipton et al. (11), it was found that out of 9,000 high school wrestlers in Iowa, 40% were certified to wrestle in the 119-138 pound weight categories. Because of this intense competition for positions in these classes, many wrestlers try to lose weight in order to qualify for lower weight categories. Another problem that can arise due to the weight class system is that in many states, no growth allowance is given to allow for the normal weight gain that may occur throughout the season in adolescent boys. Many states, including Oregon do allow an average of 3 pounds of weight gain throughout the entire season. Most states are concerned with the controversial topic of weight cycling in wrestlers and many are currently working on changing the weight regulations in order to prevent such drastic weight fluctuations. The possible changes that are being considered will be covered more thoroughly in the discussion section of this thesis.

Weight Cutting Practices in Wrestling

There exist a wide variety of weight reduction methods, some that are commonly used by competing wrestlers, and some that are only utilized by very serious athletes who cut large amounts of weight in order to gain entry into weight classes far below their given weight. The most common weight reduction methods used in wrestling are food reduction and fluid deprivation or dehydration.
According to a study conducted by Steen et. al. (7) which examined the nutritional practices of college wrestlers, 81% of the athletes reduced food intake prior to matches and 58% used fluid deprivation as the primary means of weight reduction. The majority of weight reduction takes place within the 3 days prior to the event. In a different study also conducted by Steen et. al. (1), 63 college and 368 high school wrestlers were asked to complete a questionnaire that was used to assess the patterns of weight loss and regain in today's wrestling population. The results indicated that food and fluid restriction utilized on a daily basis were more common in the high school population, whereas more severe weight loss techniques and less common food and fluid deprivation were found in higher percentage in the college population. Only 16 and 19% of the high school wrestlers never practiced food deprivation or dehydration, respectively, and 24 and 15% used these techniques, respectively, on a daily basis for weight loss and control.

Other methods of weight reduction utilized by the wrestling population include various dehydration techniques, such as sitting in saunas, exercising strenuously in a rubber suit, and exercising in very warm wrestling rooms, fasting, vomiting, the use of laxatives and diuretics, and taking contrast showers to induce urination (1,12,13,14). According to Steen and coworkers (1,7), high school and college wrestlers repeatedly gain and lose weight throughout the season. High school athletes reportedly lose an average of 5.4 kg more than eight times throughout one season, and college wrestlers lose 7.2 kg approximately 15 times during one season (1). It is due to these large weight fluctuations that the severe weight loss methods are continuing to be practiced by this group of athletes. It is only through such severe weight reduction practices that so much weight can be lost repeatedly and within a relatively short time span. The data available suggest that a relatively large percentage of wrestlers utilize some or all of the common weight loss techniques, and that many are using the severe techniques as well. An estimated 21 to 33% of all competing wrestlers use fasting or food deprivation, 15 and 20% use vomiting and laxatives respectively, and approximately 9% take diuretics for weight reduction (1).
Concerns Regarding Weight Cycling During Puberty

According to a number of recent articles dealing with the topic of weight cycling in wrestlers, there are a variety of reasons for the growing concern regarding these practices. One of the primary concerns stems from the fact that adolescent as well as college-aged athletes are following these restrictions and repeatedly losing moderate to large amounts of weight. This represents a valid concern due to the fact that a large percentage of growth takes place during the high school years, especially in males. With frequent periods of fasting and rapid weight loss, it has been thought that growth may be impaired in the adolescent population (15,16). In a study by Tipton and coworkers (17) in 1970, changes in body weight were measured in 747 high school wrestlers. Comparison of weight gains after the end of the season showed that the average weight increase was 13.6 pounds (6.2 kg) higher than weight at certification. Expected gains for this population based on growth data and prediction equations were 7.2 lbs (3.3 kg), much lower than the measured gains. Due to the fact that this increase in weight is greater than expected given the average growth changes of healthy adolescent males during the same time period, it is hypothesized that this rapid weight gain is due to a period of "catch-up" growth. Growth was measured only by weight in this particular study and not by height as might be expected.

Physiologic Effects of Weight Cycling

A number of the concerns regarding the practice of weight cycling reflect the potential negative effects that continual weight loss and regain may have on the athlete. These potential effects include: metabolic effects, performance decrements, inadequate dietary intakes, poor nutritional status, compromised endocrine, renal, and thermoregulation functions, and other long-term medical concerns (10,18).
The metabolic effects of repeated weight loss and regain in wrestlers remains controversial at this point in time. A number of studies have been conducted in the past decade, but the findings have been fairly inconsistent. In a study by Steen et al. (2), 294 high school wrestlers were surveyed over a period of two years at a wrestling camp. The wrestlers were divided into two groups, one consisting of the athletes who reportedly weight cycled and the other consisting of those athletes who did not practice weight cutting. This division was determined according to the athletes responses to the survey. There were a number of criteria required to be in either group, and from these two groups, a total of 27 subjects were selected to participate in the study, and matched for weight and age with 27 controls. Resting metabolic rate was measured by indirect calorimetry and body composition was measured using anthropometrics. The results were consistent with the expectation that the weight-cycling wrestlers would demonstrate a slower resting metabolic rate than the non-cycling wrestlers (4.6 vs. 5.5 kJ per kg of lean body mass per hour) due to the adaptation of the body to a perceived state of starvation. There was a 14% difference between the two groups for resting energy expenditure (6631 vs. 7702 kJ per day). No process of matching the two groups for percent muscle mass was mentioned, and this may have had an effect on the results due to the fact that an increased lean body mass or muscle mass will increase the metabolic rate (19).

In a study done by Melby and coworkers (20), findings contradictory to the above mentioned study were observed. The primary purpose of the study was to determine the effect of weight cycling on resting energy expenditure, and to compare the resting metabolic rate (RMR) between 12 weight-cycling college wrestlers and 13 weight-stable control subjects before, during, and after a competitive season. Once again, RMR was measured by indirect calorimetry before, during, and after the 6 month season, and body composition was determined by hydrostatic weighing along with anthropometrics. The results of this study were unexpected and contradictory to both animal and human metabolic studies, which have typically shown that with consistent weight cycling in subjects, RMR will decrease. The baseline data from the Melby study clearly
indicated that participation in several years of weight cycling was not associated with a lower RMR in the wrestlers compared with the non-cycling control group. Rather, RMR was significantly higher in the wrestlers than the control group. The calorimetry results also indicated that the wrestlers' postseason RMR's were slightly higher than their preseason RMR's (2030 vs. 1973 kcal/day), most likely due to an increase in the level of activity and possibly increased muscle mass. This difference was not significant.

The reasons for the variable results of these two studies (2,20) are unknown at this time, but possibilities include differences in the type of weight loss (fat vs. lean body mass), differences in the magnitude of the weight loss/gain cycle, and the potential effects of exercise, percent muscle mass, and fitness level on RMR. The main reason for concern regarding the effects of weight cycling on RMR is that as the weight cycling athlete ages, he may develop problems with weight control leading to obesity, which is, in turn, a high risk factor for many chronic diseases (10). Much research has focused on the effects of weight-cycling in adults in recurrent attempts to lose weight. In a classic study done by Blackburn et al. from 1973 to 1982 (21), over 1000 obese patients were recruited to participate in a weight-loss program that utilized a very-low-calorie diet (<800 calories/day). Inpatients and outpatients participated in this study, and after various intervals of diuresis, a protein-sparing modified fast (PSMF) was followed for a total of 72 days. The patients who regained at least 20% of their lost weight were placed on the PSMF diet once again for the same time period. It was found that patients lost significantly less weight during cycle 2 than during cycle 1 (0.15 kg/d vs. 0.19 kg/d).

In a study by Manore et al. (22), 11 non-obese female dieters and 12 non-dieting female controls were studied in order to determine if resting energy expenditure (REE) and exercise energy expenditure (EEE) differed between the two groups. REE was measured by indirect calorimetry, and EEE was determined by oxygen uptake. Hydrostatic weighing was used to estimate body composition, and diet records were kept for 4 to 6 days, depending on the length of the testing period. Results indicated that the dieting group weighed
significantly (20 lbs.) more and had an average of 5% more body fat than the non-dieting control group. Dieters also had a significantly lower relative REE, but no significant difference was seen in absolute REE. Exercise energy expenditure was measured as the subjects walked on a motor-driven treadmill, and relative EEE was found to be significantly lower in the dieting group rather than the control group, but absolute EEE's were similar at each workload. Results suggest an increased efficiency of food utilization during exercise in dieters but no significant difference in absolute REE.

One area that is currently in need of further research is the effect of rapid weight loss on physical performance in wrestlers. Performance variables include isometric strength, isokinetic strength, isotonic strength, anaerobic power and capacity, muscular endurance, peak oxygen uptake, and physical work capacity estimated from heart rate (10,23). The majority of the research available has had similar findings: there appears to be no statistically significant difference between anaerobic power, strength, or peak VO\textsubscript{2} uptake before and after rapid weight loss in wrestlers. In one study conducted by Webster and coworkers (23), contradictory results were found regarding rapid weight loss (defined as a 5% decrease in body weight in less than 2 days) and performance in wrestlers. After an average weight loss of 3.3 kg, or 4.9% of body weight over a period of 36 hours, no effect was observed with regard to muscular strength, but anaerobic power output and anaerobic capacity were significantly reduced in the weight loss state. Peak blood lactate accumulation, along with running time, velocity, and VO\textsubscript{2} values at the lactate threshold were also decreased during the weight loss state, which would suggest that both aerobic and anaerobic work performance was impacted by the weight loss.

The effect of weight cycling on an athlete's nutritional status has also been a common area of research in the wrestling population. According to the findings of a four-year study of university athletes dietary intakes done by Short et. al. (13), many wrestlers have diets that are low in several nutrients. This is believed to be partly due to the weight loss practices commonly used to make weight for competition. Total kilocalorie intakes ranged from 78 to more than
11,000 per day, and these particular numbers came from one athlete. Mean caloric intakes over three seasons were 2,000 to 3,800, and food intakes were documented by diet records kept from 3 days to 2 weeks, depending on the athlete. The percent of kilo-calories from fat ranged from 29 to 39%, and most of the athletes averaged more than 1 gram of protein per kilogram of body weight. The percentage of wrestlers with low intakes of specific nutrients relative to the RDA (1980) were as follows: calcium (16%), iron (10%), vitamin A (39%), thiamin (31%), riboflavin (16%), niacin (12%), and vitamin C (11%).

Comparable results were found in a study by Steen et al. in 1986 which assessed the nutritional intakes of college wrestlers (24). The findings indicated that the athletes' pre and postseason caloric intakes were generally adequate, however midseason intakes were inadequate and 37% of the athletes were not meeting their recommended caloric allowance. This allowance was based on meeting two-thirds of the RDA for adults (1980), and since this does not take activity into consideration, the caloric inadequacy of these wrestlers' diets were more than likely even more pronounced. The fat intake of this population was once again higher than what is commonly recommended, ranging from 30-38% of total calories. Alcohol use was also common and represented between 2-5% of the daily caloric intake.

It appears that these wrestlers tended to follow a diet comparable to the typical American diet, one that is high in fat and protein, and low in complex carbohydrates. A diet composed of 12-15% protein, 25-30% fat, and 55-65% of calories from carbohydrate is recommended for athletes (9,10,13,24). It was apparent that the athletes were not eating an ideal percentage of carbohydrates (55-65% of calories), and this is most likely due to a number of myths common in wrestling circles regarding this macronutrient. In a study by Steen (24), wrestlers were interviewed about food preferences and it was found that starchy foods were viewed as fattening and inappropriate for dieting. Thirty-two percent of the athletes interviewed stated that they avoided breads, pancakes, pasta, and potatoes due to the previously mentioned myths associated with high carbohydrate foods. The athletes also tended to choose foods high in protein,
and many believed that excess protein in the diet would promote larger muscles. Some athletes also felt that protein was nonfattening because what is not used for energy or muscle is excreted instead of being stored as fat. These are just a few of the common misconceptions that wrestlers tend to fall prey to, yet they clearly illustrate the need for improved nutrition education in this population.

The effects of repeated weight cutting on the functioning of the endocrine system, renal system, and thermoregulation processes are extremely controversial at this time and are only speculated about. With regard to the endocrine system and weight loss, low concentrations of serum testosterone and prolactin have been found in college wrestlers during periods of low body weight (25). Testosterone levels were found to be 32% lower in-season than postseason, and in-season levels were directly correlated with percent body fat of the athletes. Roemmich et al. (26) studied high school wrestlers to see whether this drop in testosterone levels was occurring in the younger population, and no decrease was found. This may have been due to the fact that the younger wrestlers did not lose as much weight (percent decrease in body weight) as did the college-aged athletes. Concern regarding decreased levels of serum testosterone in the scholastic aged wrestlers are related to potentially stunted growth, at least temporarily.

The concern regarding the effects of weight cutting on the renal system are related to dehydration in the athletes. Dehydration-induced weight loss leads to a decreased plasma volume, which contributes to decreased blood flow in the kidneys. Dehydration in the wrestling population is associated with decreased urine production, increased acidity and specific gravity of the urine, and the leakage of albumin and leucine amino peptidase (a kidney enzyme) into the urine (10). The presence of this kidney enzyme in the urine has been linked to mild renal ischemia, and has been seen in scholastic-aged wrestlers when dehydrated. There is as of yet no research to show sustained damage to the kidneys due to repeated dehydration (10, 18). Thermoregulatory problems are a concern in the wrestler who cuts weight by dehydration simply due to the
decreased blood flow to the skin and muscles, but no research is available at this time to substantiate these concerns.

Nutrition Knowledge of Athletes and Coaches

A number of research studies have focused on the nutrition knowledge of various high school and college-aged athletes, coaching staff, and athletic trainers. Many of the studies that have been published in this area have dealt with the wrestling population due to the weight cutting practices that are so common among the athletes. A few of the larger studies have dealt with a wide variety of athletes and have often included wrestlers among these athletic populations.

In a study by Douglas et al. in 1984 (6), the food practices and nutrition knowledge of high school athletes were analyzed to evaluate differences in knowledge between the participants in different sports. A total of 943 athletes completed a questionnaire that included a combination of sports-related questions, food practice questions, and nutrition knowledge questions. The results of the study indicated that female athletes tended to have a higher level of nutrition knowledge than the male athletes, but that they still had poorer food practices. The results also indicated that the majority of high school athletes perceived their best source of nutrition information to be their parents. A positive relationship was found to exist between the number of sport seasons completed and nutrition knowledge and food practice scores, indicating that sport participation may be a type of catalyst for increasing nutrition knowledge. The wrestlers participating in this study scored lower than average in both the food practice (46%) and nutrition knowledge (52%), indicating a definite need for nutrition education.

The nutrition knowledge and practices of coaches, athletic trainers (AT’s), and athletes were measured in a study by Parr et al. in 1984 (3). A total of 348 coaches, 179 trainers, and 2,977 athletes in both high school and college settings
were asked to answer questionnaires regarding their nutrition knowledge and practices. Two-thirds of the participants were males and two-thirds were in the high school setting. It was found that athletic trainers had the strongest nutrition backgrounds, and that 55% of them were responsible for the nutrition education of the athletes. Coaches were also responsible for this type of education, but 61% of the coaches had no formal nutrition background. The nutrition concerns of the coaches, AT's and athletes varied somewhat. The coaches and AT's were primarily concerned with the hydration status of the athletes, yet the athletes were more concerned with weight control. Protein intake was a high priority with coaches and athletes, but not with athletic trainers, whereas minerals were a concern to the AT's but not the athletes and coaches. In order to assess nutrition knowledge, the athletes were asked about their knowledge, understanding, and use of the basic four food groups, exchange lists, and U.S. dietary goals. Results indicated that 68% of the athletes were familiar with the basic four food groups and that 71% use them daily. The majority of the athletes were not familiar with either the exchange lists (76%) or the U.S. dietary goals (67%). The primary source of nutrition information for the athletes was once again parents (77%), and then other sources including television, magazines, etc., school, coaches, athletic trainers, and peers respectively.

In a study conducted by Steen and McKinney (24), a written test was utilized to assess the nutrition knowledge of college wrestlers. The mean score was 58%, but because weight control is an integral part of the sport of wrestling, it was expected that the athletes would score higher in this area than a sample of laypersons. This did not appear to be the case, and demonstrates once again that nutrition education would be most beneficial in the sport of wrestling. The wrestling population appears to lack a good understanding of basic nutrition and is highly prone to food fallacies and myths concerning food and food practices.

In the study conducted by Burky (27), a one hour nutrition education workshop was held for 143 coaches, student athletic trainers, and parents of young athletes. Pre- and post-questionnaires were completed in order to assess the effectiveness of the workshop in terms of a change in nutrition knowledge.
Results indicated that a positive change in nutrition knowledge was gained as measured by improved post-questionnaire scores, also suggesting that with minimum amount of time, adults working closely with high school athletes can gain knowledge regarding pertinent nutrition information.

Perceptions of Weight Loss in Wrestling

In a study by Weissinger et al. (4), the attitudes, knowledge, and practices of coaches concerning weight loss behaviors in high school wrestling were studied. One hundred and sixty-one wrestling coaches were surveyed regarding their perceptions of weight loss in wrestlers. The majority of coaches (61%) felt that wrestlers lost too much weight, and that only four methods of weight loss were considered both safe and effective. Those four methods were: increased exercise, skipping snacks, eating smaller meals, and counting calories. The coaches reported that they were aware of unsafe weight loss methods being practiced by the athletes, but that they also typically allowed the wrestlers to make their own decisions regarding minimal wrestling weight and which weight class to compete in.

In a similar study by Weissinger et al. (14), wrestler and parent perceptions regarding weight loss behavior in high school wrestlers were considered. The self-reports of 125 high school wrestlers regarding weight loss knowledge, attitudes, and methods were compared to the perceptions of 88 parents regarding their son's weight loss behaviors. Responses to the surveys indicated that the athletes were very likely to deliberately lose weight for the sport, and that they most often used methods such as increased exercise, caloric restriction, and fluid restriction for weight loss. Parents significantly underestimated their sons' use of extreme weight loss methods, yet were aware of the potential harmful effects of severe weight loss. Both groups felt that weight loss is overemphasized in wrestling competition.
The use of weight loss methods in the sport of wrestling in combination with the generally low level of nutrition knowledge indicate a strong need for nutrition education intervention in the schools. Auld et al. (28), have found that less than 45% of high schools in Pennsylvania have nutrition intervention programs for athletes in need of information, and this is suspected to be similar if not worse in other states. Some of the perceived obstacles for these intervention programs include: time, lack of funding, lack of administrative support, and a general lack of qualified personnel.

Competitiveness in Athletics

The role of competitiveness in athletics is at this point a controversial and fairly young area of research. With the study of sport psychology increasing in popularity, more emphasis is being placed on the emotional and psychological aspects of sport participation, rather than focusing solely on the physical dimension. A number of research projects have now looked at the relationship of competitiveness and sport participation, as well as the relationship of competitiveness to other factors.

Dianne L. Gill, one of the developers of the Sport Orientation Questionnaire (SOQ) (appendix 2) , has been one of the leaders in the study of competitiveness in athletics. In one of her studies, she looked at gender differences in competitive orientation and sport participation (29). Findings indicated that high school and college-aged males consistently scored significantly higher than females of the same ages on competitiveness and win orientation, and that males also reported participation in more competitive activities than females. Spence and Helmreich (30), who have also researched this relationship by means of another form of questionnaire, also found that males tend to score much higher on competitiveness than females. This is not to suggest that females are non-competitive, simply that they tend to participate in less competitive sports.
The relationship between competitive orientation and religious orientation has also been studied by Gill and coworkers (31). Religious orientation was measured by 6 subscales of religious belief including: extrinsic/intrinsic, external/internal, and orthodox and interaction. The study examined the relationship of religious orientation, along with athletic experience, gender, and college type (secular vs. non-secular) to competitive orientation in sport. Results suggested that there is a positive relationship between religious orientation and competitive orientation beyond the influence of gender or athletic experience, and that religious orientation may affect how one approaches and interprets different sport situations that they are involved in.

Another study by Gill et al. (32) looked at the relationship of competitiveness and achievement orientation to participation in sport and nonsport activities. The SOQ was utilized along with various other achievement and competitiveness measures. The findings obtained with 266 high school and 86 university students indicated that the competitiveness scores were the best discriminators between sport participants and nonparticipants out of the scores used. In other words, the sport participants scored higher on the competitiveness sections of the questionnaires than sport non-participants. This study was also useful in supporting the validation of the Sport Orientation Questionnaire, as a number of other measures were also used for comparison. Some of these include: the Work and Family Orientation questionnaire (WOFO) (33), the Sport Competition Anxiety Test (SCAT) (34), and the Sport Competition Trait Inventory (SCTI) (35).

A number of studies have looked at the relationship between competitive orientation and self-efficacy or confidence in athletes along with various other factors such as sport-confidence, anxiety, and performance (36,37). Similar results regarding the relationship between competitiveness and self-efficacy indicated that many wrestlers enjoy wrestling only if they perceive a strong ability in the sport. In a study by Burton and Martens (37), the reasons for quitting the sport of wrestling were explored, and it was found that the wrestlers who stayed with the sport demonstrated significantly higher perceived ability, better win-loss
records, more positive expectations, and valued the sport more than the drop-outs did.

Research Needed in this Area

At this point in time, with the emphasis on winning in the sports arena, additional research is needed to determine the effects of performance pressures on young athletes. The fact that many wrestlers cut weight in order to gain a competitive edge over an opponent numerous times throughout a season indicates that more psychological research as well as a better system for weight classifications are needed. Also, it will be important to further investigate methods of prevention with regards to weight cutting. Other research that has been controversial in this group of athletes includes research looking at the physiologic effects of rapid, severe weight cutting, and whether or not performance decrements really are a potential consequence of this practice. Unfortunately, the only way to decrease the occurrence of weight cutting is to show that the negative effects of weight cutting outweigh the perceived benefits, and for this to be accomplished, continued research as well as increased nutrition education is required. Also, studies need to be done looking at the effect of solid nutrition education on the practice of weight cutting. The fact that wrestling has become such a controversial sport secondary to the practices followed by the athletes will help to promote increased research in this much needed area.
III. Methods

Experimental Design

This study was designed to measure the relationships between the levels of nutrition knowledge, competitiveness, and the degree of weight cutting practiced by high school wrestlers in the Mid-Willamette Valley. The participants were to include all coaches, assistant coaches, and as many wrestlers as possible.

Two school districts within the same class (4A) were targeted due to proximity and feasibility with regard to travel time required. All schools located within the Mid-Willamette Valley (within a 60 mile radius) were asked to participate. Twelve of the seventeen chose to do so. Coaching staff and wrestlers of each participating team were asked to voluntarily complete the required components of the study process.

Description of Subjects

The concept of this project began in the spring of 1992, and was begun in the fall of the same year. The project was approved by the Oregon State University Human Subjects Committee in order to protect the participants. A total of seventeen Mid-Willamette Valley 4A high schools were selected to be included in the study primarily due to proximity and number of students per school. 4A schools are the largest schools in Oregon and therefore are expected to have more students participating in athletics than the smaller schools. The athletic directors of each school were contacted first by mail and then by telephone to determine their willingness to participate. All of the athletic directors were very supportive of the project but preferred to leave the decision to participate up to the head wrestling coach of the school. Head wrestling coaches of the seventeen
schools were then contacted first by letter format and then by phone. The letter included a preliminary information questionnaire (Appendix 2) which would be used to gain some general information about the teams, such as the estimated number of wrestlers expected to participate that year, the number of assistant coaches, placement in district the past year, and whether or not the teams kept daily weight records for the athletes throughout the wrestling season.

Twelve of the seventeen high schools were interested in participating in the study, the other five choosing not to due to time constraints. The schools who participated were the following:

Salem area schools: McNary, North and South Salem
Corvallis area schools: Corvallis and Crescent Valley
Albany area schools: South and West Albany
Lebanon area schools: Lebanon
Eugene/Springfield area schools: North and South Eugene, Springfield and Willamette

The subject population included 180 high school wrestlers ranging in year in school from freshman to senior, and 29 coaches (12 head coaches, and 17 assistant coaches). The breakdown of participants per grade level and per team can be found in Tables 2 and 3, respectively.

Evaluation Instruments

Two questionnaires were utilized to measure the nutrition knowledge and competitiveness in both the athletes and the coaching staff. The nutrition knowledge questionnaire (Appendix 2) was developed by a former Oregon State University graduate student, Susan Marie Burky (1985) (27), to measure the level of nutrition knowledge of coaches. The questionnaire was slightly modified in order to assess knowledge in the areas of sports nutrition and current fads. Modifications included rewording of questions that were not appropriate to the participating population such as changing "female athletes" to "endurance athletes" in one question, and also updating the questions to reflect current
nutrition teaching, such as changing the "four food groups" to the current "five food groups" being utilized. The last modification that was made was to add a section of 5 questions which dealt specifically with sports nutrition information and common myths. Five major sections completed the knowledge portion of the questionnaire. These included: nutrient composition of foods, vitamins and minerals in athletic performance, general nutrition in athletics, pre-game nutritional practices, and common myths in sports nutrition. A Likert-type scale was used for the 21 general nutrition and athletics questions (4 points possible for each), and an agree/disagree/don't know scale was used for the remaining 18 questions (1 point possible for each) excluding the nutrient composition questions. The 5 nutrient composition questions were answered by marking the appropriate choices with a check (points possible varied for each question) and the final 3 questions dealt with appropriate meal choices and timing of meals (2 points possible for the 3 questions). The highest score possible was 147 points.

This questionnaire had been developed for coaches, athletic trainers and parents and was used in the study done by Burky (1985). In order to assess the validity of this questionnaire with regard to high school athletes, an entry level college nutrition class was asked to complete the questionnaire at the beginning and the end of the course. This pilot test was done in order to determine the appropriateness of the nutrition knowledge questionnaire for the targeted population. The questionnaire was originally designed for use with high school coaches, athletic trainers and parents, but had not previously been utilized to measure the knowledge levels of high school athletes. There was concern that the test would be difficult for the student athletes, so a pilot test was designed to rule out this concern.

Two entry level freshman nutrition classes were asked to complete the nutrition knowledge questionnaire. The first class of 49 students completed the questionnaire at the end of the winter quarter, after having completed their nutrition course, and the second class of 54 students completed the questionnaire prior to the start of the spring term course. Ideally, one class would
have been asked to complete pre and post questionnaires, but due to the timeline available, this was not possible.

The students were asked whether or not the questions were ambiguous, or the directions difficult to follow. None of the students appeared to have problems completing the task. Results of the pre and post testing were not a primary concern, but were used as baseline information regarding the scoring of the wrestlers and their coaches. The scores were very similar to those found in the adult population, suggesting that the questions were appropriate and easy to follow for younger students as well. The results are as follows:

Table 1: Pilot Test: Pre and Post Test Results of Nutrition Knowledge

<table>
<thead>
<tr>
<th>Time</th>
<th># of subjects</th>
<th>Mean score: out of 147</th>
<th>Stand. Dev.</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>49</td>
<td>87.1 (59%)</td>
<td>12.7</td>
<td>65-120</td>
</tr>
<tr>
<td></td>
<td>36 F, 13 M*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>54</td>
<td>100.0 (68%)</td>
<td>10.6</td>
<td>71-121</td>
</tr>
<tr>
<td></td>
<td>35 F, 19 M*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*F= female       M= male

The second tool utilized in this project was the Sports Orientation Questionnaire (SOQ) which was developed by Diane L. Gill (1988) (Appendix 2) (38). The SOQ measures the three separate but related components of sport orientation: competitiveness, win orientation, and goal orientation. All three measures were analyzed, but the emphasis was on competitiveness. The SOQ has been found to be stable, reliable and valid when utilized by high school and college athletes (38). The SOQ has never been used to measure these three traits in the coaching population, but when the author of the questionnaire was contacted, she felt that there was no reason why this questionnaire would not
work for this population as well. With this questionnaire, the participant is asked to read 25 statements which describe reactions to sports situations, and then to circle a number on the given Likert scale depending on their reaction to the question. Competitiveness scores can range from 13 to 65 points, with a score of 65 representing a very competitive attitude.

Procedures

Preliminary visits were made to each school between November 17th and December 5th in order to explain the objectives of the study to the wrestling teams and to hand out consent forms (Appendix 2). The athletes were asked to take the forms home, read them over with their parents and then sign and return them in the stamped, addressed envelopes to the author. Forms with the athletes names, parent's names, and phone numbers were collected as the consent forms were handed out in order to gain access to the students in case of the need for reminders. Coaches were asked to read and sign the forms during the time the author was present. Approximately 350 consent forms were handed out to the wrestlers, including a number of extra forms that were left with the coaches for absent athletes, or athletes who needed replacement forms. Approximately 200 (57%) consent forms were returned signed by both the athlete and parent, allowing participation of the athletes. Eighteen of the athletes who completed the forms ended up quitting the teams prior to data collection and therefore did not participate. The final number of athletes participating was 180.

Dates and times were set up for the completion of the questionnaires with each team between the 6th and 28th of January. It had been planned that each team would complete the competitiveness questionnaire twice, once at the beginning and once at the end of the season in order to monitor changes occurring due to the time of the season, but this schedule was not possible due to two weeks of snow and consequent school closures throughout January and February.
Three teams with a total of 65 wrestlers were randomly chosen to be used in the weight validation procedures and these validations took place after all teams had completed the questionnaires. The validation procedures took place one day prior to a scheduled meet or competition, and the coaches were asked to begin practice as usual, with the athletes weighing in prior to practice. A male assistant in this study gathered the participating wrestlers who were present and asked them to re-weigh themselves with the assistant monitoring the measurement. Many weight records were found to be incomplete and many of the athletes were not consistently recording their weights. For example, many athletes would have only one weight recorded for an entire week. The coaches were asked to continually remind the athletes of the importance of weighing in and recording daily weight.

At the end of the wrestling season, all coaches were asked to photocopy scorebooks and weight charts for the season to be utilized to measure the degree of weight cutting practiced by the athletes.

Statistical Analysis

Multiple analysis of variance or multiple ANOVA's were used to determine the existing differences between the levels of nutrition knowledge, competitiveness, win orientation, and goal orientation of the various grade levels of the wrestlers and the coaching staff. Multiple range analysis was used to determine significant differences in these same areas, using a P value of .05 or less as significant, and descriptive statistics such as means, standard deviations, and ranges were utilized to describe the population characteristics. Statgraphics, Version 6 (Manugistics) was utilized to run the statistics via computer. The Oregon State University Department of Statistics was consulted regarding the use of these statistical analyses.
IV. Results

A total of 180 high school wrestlers and 29 high school wrestling coaches and assistant coaches from 12 different schools completed this study. The characteristics and breakdown of grade levels are shown in Table 2. The percentage of wrestlers from each of the four grade levels was fairly consistent, and the age range was 13-18 years. For the coaches, there was wide variation in the number of years of coaching experience, with a range of 1 to 33 years. Each team had one head coach (41% of total coaches), and a varying number of assistant coaches (59% of total coaches), often depending on the size of the team.

Table 2. Characteristics of High School Wrestlers and Coaches

<table>
<thead>
<tr>
<th>Coaches:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>29</td>
</tr>
<tr>
<td>Head coaches</td>
<td>12 (41%)</td>
</tr>
<tr>
<td>Assist. coaches</td>
<td>17 (59%)</td>
</tr>
<tr>
<td>Mean years coaching</td>
<td>9.68</td>
</tr>
<tr>
<td>Range years coaching</td>
<td>1-33</td>
</tr>
</tbody>
</table>

Wrestlers:

<table>
<thead>
<tr>
<th>Sample size</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age range (years)</td>
<td>13-18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade in school</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>52 (28.9%)</td>
</tr>
<tr>
<td>10th</td>
<td>37 (20.6%)</td>
</tr>
<tr>
<td>11th</td>
<td>47 (26.1%)</td>
</tr>
<tr>
<td>12th</td>
<td>44 (24.4%)</td>
</tr>
</tbody>
</table>

The number of wrestlers and coaches participating per school are shown in Table 3. These numbers varied greatly due to the fact that some schools had
total team sizes of 10 wrestlers whereas others within the same district had up to 60 participating wrestlers. On average, 40 to 50% of the athletes from each team participated in this study.

Table 3. Number of High School Wrestlers and Coaches per School

<table>
<thead>
<tr>
<th>School</th>
<th>Number of Wrestlers</th>
<th>Number of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>06</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>05</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>06</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Total:</td>
<td>180</td>
<td>29</td>
</tr>
</tbody>
</table>

Nutrition Knowledge

Table 4 gives the results of the nutrition knowledge portion of the study. The overall mean score of the wrestlers was 79.26 out of a possible 147 points, or 53.9% and the mean score for the coaches was 99.17 or 67.5%. The mean nutrition knowledge scores increased with grade level, as would be expected. Using a multiple ANOVA, significant differences were seen between 9th and 12th grade levels as well as between 9th and 11th grade levels (p=.0001). The freshman high school wrestlers scored significantly lower than all of the other classes (p=.0001) and the junior wrestlers scored significantly lower than the seniors (p=.0028).
Table 4. Mean Nutrition Knowledge Scores of High School Wrestlers and Coaches

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Wrestlers:</th>
<th>Coaches:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Score:</td>
<td>St. Deviation:</td>
</tr>
<tr>
<td></td>
<td>(147 possible)</td>
<td></td>
</tr>
</tbody>
</table>

Wrestlers:

<table>
<thead>
<tr>
<th>(Grade level)</th>
<th>(#)</th>
<th>Mean Score</th>
<th>St. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>(52)</td>
<td>72.05 (49.0%)</td>
<td>16.74</td>
<td>32-103</td>
</tr>
<tr>
<td>10th</td>
<td>(47)</td>
<td>80.28 (54.6%)</td>
<td>15.68</td>
<td>38-107</td>
</tr>
<tr>
<td>11th</td>
<td>(37)</td>
<td>79.22 (53.9%)</td>
<td>16.24</td>
<td>45-112</td>
</tr>
<tr>
<td>12th</td>
<td>(44)</td>
<td>86.73 (59.0%)</td>
<td>14.10</td>
<td>32-112</td>
</tr>
<tr>
<td>Overall mean</td>
<td></td>
<td>79.26 (53.9%)</td>
<td>16.5</td>
<td>32-112</td>
</tr>
</tbody>
</table>

* Letters falling within columns denote similar scores (P>.05) between grades.

Coaches:

<table>
<thead>
<tr>
<th></th>
<th>Mean Score</th>
<th>St. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>All coaches (29)</td>
<td>99.17 (67.5%)</td>
<td>10.79</td>
<td>78-119</td>
</tr>
<tr>
<td>Head coaches (12)</td>
<td>99.67 (67.8%) a</td>
<td>12.59</td>
<td>78-119</td>
</tr>
<tr>
<td>Asst. coaches (17)</td>
<td>98.82 (67.2%) a</td>
<td>9.72</td>
<td>80-118</td>
</tr>
</tbody>
</table>

*Letters falling within columns denote similar scores (P>.05) between groups.

Team Scores:

<table>
<thead>
<tr>
<th></th>
<th>Mean Score</th>
<th>St. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81.17 (55.2%) a b c</td>
<td>15.50</td>
<td>48-118</td>
</tr>
<tr>
<td>2</td>
<td>76.50 (52.0%) a</td>
<td>19.81</td>
<td>32-111</td>
</tr>
<tr>
<td>3</td>
<td>84.50 (57.5%) a b c</td>
<td>17.04</td>
<td>42-112</td>
</tr>
<tr>
<td>4</td>
<td>90.08 (61.3%) b</td>
<td>12.29</td>
<td>64-107</td>
</tr>
<tr>
<td>5</td>
<td>83.88 (57.1%) a b c</td>
<td>16.23</td>
<td>59-106</td>
</tr>
<tr>
<td>6</td>
<td>92.71 (63.1%) b c</td>
<td>12.46</td>
<td>77-107</td>
</tr>
<tr>
<td>7</td>
<td>73.50 (50.0%) a</td>
<td>14.56</td>
<td>51- 93</td>
</tr>
<tr>
<td>8</td>
<td>84.89 (57.7%) a b c</td>
<td>18.42</td>
<td>42-110</td>
</tr>
<tr>
<td>9</td>
<td>82.09 (55.8%) a b c</td>
<td>16.18</td>
<td>50-119</td>
</tr>
<tr>
<td>10</td>
<td>74.08 (50.4%) a</td>
<td>23.77</td>
<td>45-118</td>
</tr>
<tr>
<td>11</td>
<td>78.74 (53.6%) a b</td>
<td>15.97</td>
<td>43-106</td>
</tr>
<tr>
<td>12</td>
<td>77.00 (52.4%) a b</td>
<td>19.86</td>
<td>38-103</td>
</tr>
</tbody>
</table>

*Letters falling within the same column denote similar mean scores (P>.05) between the various schools.

The coaches as a whole scored significantly higher than the wrestlers (p=.0001), but no significant difference was seen between the head coaches mean score and the assistant coaches' mean score. The nutrition knowledge scores of the
coaches did increase significantly with increasing years of coaching (p=.0001), suggesting that some knowledge of nutrition is gained with coaching experience or with age. The mean nutrition knowledge scores of the individual teams varied significantly (p=.0041), using multiple range analysis, with some teams scoring as low as 50% for a mean and others scoring up to 63% as a mean score. Possible explanations for this variability may be found in the discussion section. There were not significant differences between the coaches' mean nutrition knowledge scores and their respective teams' mean scores were (p=.7656), however, there was a significant correlation between the teams' mean scores and the head coach's scores (p=.0001), possibly indicating the importance of the role of the head coach regarding the dispersement of correct and up to date nutrition information to the wrestlers.

It was found that the nutrition knowledge scores of the wrestlers were significantly higher (p=.0046), with an average of 7.7 points (79.9 vs. 87.6) when a nutrition course had been taken in high school. One hundred and twelve of the 180 (62%) participating students were found to have previously taken this type of course. The effect of the wrestlers' level of nutrition knowledge did not, however, influence the incidence of weight cutting (self-reported) or the amount of weight reportedly lost prior to competitions (p=.1041) in this population. Also, the number of days that a wrestler reported taking to lose the weight prior to competing was not found to correlate with the level of nutrition knowledge (p=.4342). In other words, it was not found that the wrestlers with lower nutrition knowledge scores lost weight more quickly than the wrestlers with higher scores.

The complete breakdown of responses to each nutrition knowledge question given by the coaches and the wrestlers can be found in Appendix 2. It was found that there were certain areas of nutrition knowledge that were poorly understood by both coaches and athletes, and other areas that were more familiar to the groups. The coaches appeared to have the most difficulty with 3 particular areas, scoring poorly with the sections regarding appropriate food sources (questions 1-5), information on vitamins and minerals in athletics (questions 7a-7g), and also the largest portion of the questionnaire regarding
general nutrition in athletics (questions 8a-8u). Portions of the questionnaire in which the coaches scored very well included the question regarding the appropriate pre-competition meal (question 6), and also the section of the questionnaire regarding pre-competition nutritional practices (questions 9a-9f).

The athletes appeared to have a difficult time with the majority of the questionnaire, and responses were very sporadic, with many incorrect responses for each question, as can be seen in Appendix 2. The only question in which a significant number of correct responses was seen was the question dealing with an appropriate pre-competition meal (question 6). Only 11 of the 178 wrestlers (6%) who answered the question, answered it incorrectly.

Competitiveness

The results of the competitiveness scores can be seen in Table 5. The mean score for the wrestlers was 58.46 +/- 6.2 out of a possible total of 65, indicating a skewed distribution and a very competitive group overall. The mean score for the coaches was 58.64 +/- 5.0, and no significant difference was found between the scores of the head and assistant coaches (p=.35). The results of the competitiveness portion of the study showed only one significant correlation and that was between the number of years of participation in wrestling and an increasing competitiveness score (p=.017). This simply indicates that with increasing participation in the sport, competitiveness levels tended to increase or the athletes who are less competitive drop out of the sport. No significant differences were seen between the mean scores for the different grade levels, as most scores tended to be on the high end of the range, indicating a group that is more competitive than the average. Also, no significant relationship existed between the coaches' scores and the teams' scores (p=.393), refuting the hypothesis that if a coach is extremely competitive, his wrestlers may also be that way. No interrelationship was found between the amount of reported weight lost before a competition (Table 8) and competitiveness levels (p=.166). Team scores were not significantly different overall, but some teams scored significantly higher
than others (p=.05), such as teams 5, 8, 7, and 1. It is important to note that all of the competitiveness scores were extremely high, making it difficult to investigate true interrelationships. Lastly, using two-sample analysis, no significant difference was seen in the competitiveness scores of the 113 wrestlers who placed at the district meet versus the 67 non-district placing wrestlers (p=.396).

Information regarding win/loss records and district placement versus competitiveness levels was unable to be assessed due to poor record keeping.

Table 5. Mean Competitiveness Scores of High School Wrestlers and Coaches

<table>
<thead>
<tr>
<th></th>
<th>Mean Score: (65 Possible)</th>
<th>St. Deviation:</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrestlers:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Grade level)</td>
<td>(#)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td>(52)</td>
<td>59.01</td>
<td>5.24</td>
</tr>
<tr>
<td>10th</td>
<td>(37)</td>
<td>56.90</td>
<td>6.53</td>
</tr>
<tr>
<td>11th</td>
<td>(47)</td>
<td>58.75</td>
<td>7.71</td>
</tr>
<tr>
<td>12th</td>
<td>(44)</td>
<td>59.18</td>
<td>5.33</td>
</tr>
<tr>
<td>Overall mean</td>
<td></td>
<td>58.46</td>
<td>6.20</td>
</tr>
<tr>
<td>Coaches:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All coaches</td>
<td>(29)</td>
<td>58.64</td>
<td>5.01</td>
</tr>
<tr>
<td>Head coaches</td>
<td>(12)</td>
<td>57.58</td>
<td>5.68</td>
</tr>
<tr>
<td>Asst. coaches</td>
<td>(17)</td>
<td>59.38</td>
<td>4.50</td>
</tr>
<tr>
<td>Team Scores:</td>
<td></td>
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<tr>
<td>1</td>
<td></td>
<td>60.42</td>
<td>4.46</td>
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<td>2</td>
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<td>58.35</td>
<td>7.78</td>
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<td>3</td>
<td></td>
<td>58.19</td>
<td>5.36</td>
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<tr>
<td>4</td>
<td></td>
<td>57.12</td>
<td>7.22</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>61.75</td>
<td>3.37</td>
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<td>6</td>
<td></td>
<td>54.79</td>
<td>6.90</td>
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<td>60.43</td>
<td>4.28</td>
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<td>58.50</td>
<td>5.23</td>
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<td></td>
<td>54.65</td>
<td>11.10</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>57.87</td>
<td>4.91</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>59.29</td>
<td>7.38</td>
</tr>
</tbody>
</table>
Mean Win Orientation

Mean win orientation scores are found in Table 6. As with the competitiveness scores, the scores were high overall. The mean score for win orientation in the wrestlers was 24.66 +/- 3.96 out of a possible 30 points, and the coaches average was 23.17 +/- 4.62. No significant differences were found between the scores for the different grade levels (p = .102) or among the scores for the head and assistant coaches. Using multiple analysis of variance, no significant difference was seen between the coaches' score and the teams' score (p = .08). The mean scores by team were also not significantly different.

Table 6. Mean Win Orientation Scores of High School Wrestlers and Coaches

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Mean Score</th>
<th>St. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrestlers:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Grade level)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td>24.96</td>
<td>3.39</td>
<td>15-30</td>
</tr>
<tr>
<td>10th</td>
<td>24.68</td>
<td>4.05</td>
<td>14-30</td>
</tr>
<tr>
<td>11th</td>
<td>24.22</td>
<td>4.47</td>
<td>13-30</td>
</tr>
<tr>
<td>12th</td>
<td>24.66</td>
<td>4.12</td>
<td>14-30</td>
</tr>
<tr>
<td>Overall mean</td>
<td>24.66</td>
<td>3.96</td>
<td>13-30</td>
</tr>
<tr>
<td>Coaches:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All coaches</td>
<td>23.17</td>
<td>4.62</td>
<td>10-30</td>
</tr>
<tr>
<td>Head coaches</td>
<td>22.25</td>
<td>5.63</td>
<td>10-29</td>
</tr>
<tr>
<td>Asst. coaches</td>
<td>23.82</td>
<td>3.81</td>
<td>17-30</td>
</tr>
<tr>
<td>Team Scores:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25.17</td>
<td>3.64</td>
<td>14-29</td>
</tr>
<tr>
<td>2</td>
<td>25.10</td>
<td>4.11</td>
<td>15-30</td>
</tr>
<tr>
<td>3</td>
<td>23.64</td>
<td>3.60</td>
<td>16-29</td>
</tr>
<tr>
<td>4</td>
<td>24.24</td>
<td>5.08</td>
<td>14-30</td>
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<tr>
<td>5</td>
<td>27.38</td>
<td>2.07</td>
<td>24-29</td>
</tr>
<tr>
<td>6</td>
<td>24.43</td>
<td>3.78</td>
<td>20-29</td>
</tr>
<tr>
<td>7</td>
<td>22.86</td>
<td>5.21</td>
<td>14-29</td>
</tr>
<tr>
<td>8</td>
<td>25.28</td>
<td>3.10</td>
<td>18-30</td>
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<tr>
<td>9</td>
<td>25.64</td>
<td>3.20</td>
<td>20-30</td>
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<tr>
<td>10</td>
<td>22.08</td>
<td>5.52</td>
<td>13-30</td>
</tr>
<tr>
<td>11</td>
<td>24.04</td>
<td>3.43</td>
<td>17-30</td>
</tr>
<tr>
<td>12</td>
<td>23.25</td>
<td>5.33</td>
<td>10-29</td>
</tr>
</tbody>
</table>
Mean Goal Orientation

Mean goal orientation scores are found in Table 7. No significant relationships between groups were found with these scores. The average score for the wrestlers was 27.37 +/- 2.79 out of 30 and the scores were very similar throughout the four grade levels. The mean score for the coaches was 28.28 +/- 1.67, and no significant difference was seen between the head and assistant coaches (p=.89). Team scores were also very similar with this measurement tool. The relationship between the coaches' scores and the teams' mean scores were not significant (p=.976).

Table 7. Mean Goal Orientation Scores of High School Wrestlers and Coaches

<table>
<thead>
<tr>
<th>Wrestlers: (Grade level)</th>
<th>Mean Score: (30 possible)</th>
<th>St. Deviation:</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>27.31</td>
<td>2.36</td>
<td>21-30</td>
</tr>
<tr>
<td>10th</td>
<td>27.02</td>
<td>3.08</td>
<td>18-30</td>
</tr>
<tr>
<td>11th</td>
<td>27.16</td>
<td>3.30</td>
<td>12-30</td>
</tr>
<tr>
<td>12th</td>
<td>28.00</td>
<td>2.41</td>
<td>21-30</td>
</tr>
<tr>
<td>Overall mean</td>
<td>27.37</td>
<td>2.79</td>
<td>12-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coaches:</th>
<th>Mean Score: (30 possible)</th>
<th>St. Deviation:</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>All coaches</td>
<td>28.28</td>
<td>1.67</td>
<td>25-30</td>
</tr>
<tr>
<td>Head coaches</td>
<td>27.75</td>
<td>2.05</td>
<td>25-30</td>
</tr>
<tr>
<td>Asst. coaches</td>
<td>28.64</td>
<td>1.27</td>
<td>26-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Schools:</th>
<th>Mean Score: (30 possible)</th>
<th>St. Deviation:</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.04</td>
<td>1.16</td>
<td>24-30</td>
</tr>
<tr>
<td>2</td>
<td>28.20</td>
<td>2.50</td>
<td>21-30</td>
</tr>
<tr>
<td>3</td>
<td>27.45</td>
<td>2.29</td>
<td>22-30</td>
</tr>
<tr>
<td>4</td>
<td>27.36</td>
<td>2.36</td>
<td>23-30</td>
</tr>
<tr>
<td>5</td>
<td>27.63</td>
<td>2.33</td>
<td>23-30</td>
</tr>
<tr>
<td>6</td>
<td>26.43</td>
<td>1.90</td>
<td>24-29</td>
</tr>
<tr>
<td>7</td>
<td>27.14</td>
<td>2.97</td>
<td>21-30</td>
</tr>
<tr>
<td>8</td>
<td>27.33</td>
<td>2.91</td>
<td>21-30</td>
</tr>
<tr>
<td>9</td>
<td>27.55</td>
<td>2.84</td>
<td>18-30</td>
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<td>10</td>
<td>25.58</td>
<td>5.05</td>
<td>12-30</td>
</tr>
<tr>
<td>11</td>
<td>27.09</td>
<td>2.39</td>
<td>21-30</td>
</tr>
<tr>
<td>12</td>
<td>27.25</td>
<td>2.53</td>
<td>22-30</td>
</tr>
</tbody>
</table>
Other Information Gained

Other information that was gained from the study included background data from the participants, such as the number who have had nutrition courses in high school, those who use supplements (vitamins and amino acids), as well as information regarding weight loss during the season, years of participation in wrestling, and weight classes competed in. The results of this information is assembled in Table 8.

The average number of years spent in competitive wrestling for the participants was 3.2 and ranged from 1 to 12 years, a wide variation considering the age of the participants. Many wrestling programs are available for children starting at the age of 5 years.

There are 13 weight classes given in pounds in high school wrestling: 98, 106, 115, 123, 136, 141, 148, 157, 168, 178, 191, and heavyweight for wrestlers over 191 lbs. The average weight class of the population studied was 6.7 (out of the possible 13), with a standard deviation of 3.4, indicating that a majority of the wrestlers compete near the middle weight classes, with the minority competing in the very light or very heavy weight classes.

The amount of weight lost prior to a wrestling match can range from 0 to 21 pounds (1), and the breakdown of the weight loss categories (1-4) is shown in Table 8. The average self-reported weight loss 1.3 (out of 4 categories), with a standard deviation of 1.2, indicating that of the wrestlers who lost weight before a match, between .5 and 5 pounds was the common amount lost. No further breakdown was available. No significant difference in the level of nutrition knowledge was seen for the 115 (64%) wrestlers who cut weight for matches versus the 65 who did not (p=.1041).

Out of 180 high school wrestlers, 111 or 62% were found to have taken a nutrition course in high school. The incidence of participation in a nutrition course was found to significantly increase with the increasing grade in school (p=.0001), so it was much less likely for a freshman to have taken a course than a senior. It was also found that the students who had taken a nutrition course scored
significantly higher on the nutrition knowledge questionnaire (p=.0046), with average scores of 87.6 versus 79.8 for the students who had not taken a nutrition course.

### Table 8. General Information Provided by High School Wrestlers on General Data Form

<table>
<thead>
<tr>
<th>Question of interest</th>
<th>Number:</th>
<th>Percentage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Average number of years wrestling:</td>
<td>Range: 1-12</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Average: 3.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. Dev: 2.5</td>
<td></td>
</tr>
<tr>
<td>2. Average weight lost per match in pounds:</td>
<td>Range: 1-4</td>
<td>115 out of 180 wrestlers reported losing weight to compete (64%)</td>
</tr>
<tr>
<td></td>
<td>1 = 0-2 lbs.,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = 3-5 lbs.,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = 6-10 lbs.,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = 11-20 lbs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average: 1.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. Dev: 1.2</td>
<td></td>
</tr>
<tr>
<td>3. Breakdown of the different wt. classes:</td>
<td>Range: 1-13</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Average: 6.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. Dev: 3.4</td>
<td></td>
</tr>
<tr>
<td>4. Students who had taken a nutrition course in high school:</td>
<td>111/180</td>
<td>62%</td>
</tr>
<tr>
<td>5. Students who took vitamin supplements:</td>
<td>67/180</td>
<td>37%</td>
</tr>
<tr>
<td>6. Students who took amino acid supplements:</td>
<td>17/180</td>
<td>9.5%</td>
</tr>
<tr>
<td>7. Students who took both vitamin and amino acid supplements:</td>
<td>12/180, 12/17</td>
<td>6.6% of total 70.5% of those who took amino acid supplements also took vitamins.</td>
</tr>
</tbody>
</table>
total of 67 students (37%) reported taking multivitamin (MVI) supplements at least 5 times per week and 17 (9.5%) reported taking amino acid (AA) supplements. Twelve of these 17 students (70.5%) took both MVI and AA supplements, possibly indicating a strong belief in the benefits of taking pills in addition to food. The use of AA or MVI supplements was not significantly related to an increased competitiveness score (p=.3589 and .8500, respectively), and nutrition knowledge also was unrelated to the use of AA or MVI supplements (p=.9294 and .0715, respectively).

Unfortunately, due to inconsistent record keeping of weight charts by the teams, insufficient data was available to research the interrelationships of weight loss patterns and nutrition knowledge and competitiveness in this particular population. Weight charts were to be analyzed in order to determine the amount of weight lost in pounds prior to competitions, and also to determine the number of wrestlers who lost weight in order to get entry into a lower weight class. It was suspected that a wrestler who lost larger amounts of weight to compete in lower weight classes may be likely to be more competitive than a wrestler who loses no weight to compete.
V. Discussion

The results of this study suggest that the nutrition knowledge levels of the high school wrestlers and high school wrestling coaches participating in this research was very low overall (3, 7), and yet the competitiveness levels were extremely high when compared to similar research done previously (38). The scores for nutrition knowledge were disturbingly low in this population, athletes and coaches included, with average scores of 54% and 67.5% correct answers, respectively. Similar studies have also found that high school athletes tend to score poorly on nutrition knowledge tests, with an average of 40 to 50% correct answers (3, 7). The overall nutrition knowledge scores of the coaches were very similar to earlier findings utilizing the same questionnaire (Burky, 1985) (27), but the overall percentage of correct answers (67.5%) for the coaches indicates that a definitive need for nutrition updates in the schools are not only needed but should be mandatory for any population working with adolescent athletes. It is especially important for coaches working with athletes, such as wrestlers, who are so prone to nutrition myths and misconceptions. It has been found in previous studies (1, 13), that highly competitive athletes, such as wrestlers and long-distance runners, are often prone to food fads and unconventional performance improvement methods.

Although the overall scores of the coaches were low, and this is a concern, there were particular areas of the questionnaire in which they did not perform well such as: vitamin/mineral usage and athletics, food/nutrient sources, and general nutrition and athletics. Previous findings (3, 4) suggest that many coaches fall prey to the same myths as their student athletes in hopes of improved performance, and many of these myths are based on non-scientifically proven fads and products. Similar research has revealed that high school and college level coaches routinely score poorly on nutrition knowledge, with an average of less than 70% of the questions answered correctly (3, 5). It was hypothesized that the coaches' level of nutrition knowledge would affect the teams' scores, and
it was found that there was a significant correlation between the head coaches' score and the teams' mean score, suggesting that the role of the head coach may be vital to the dispersement of correct nutrition information to the athletes. Many of the head coaches involved in this study did report via the coaches questionnaire that they recognize this role and handle the education of the athletes more often than the assistant coaches.

Previous research has shown that coaches are often a primary source of nutrition information for high school athletes, along with parents and peers (3,5). For example, in the study by Parr et al. (3), in which a large number of coaches (348), athletic trainers (179), and athletes (2,977) answered questionnaires about their nutrition knowledge and practices, the researchers found that wrestlers and swimmers rely more heavily on their coaches than do football and baseball players for nutrition information. Unfortunately, most coaches do not have the time to research new information along with all of their other responsibilities, and therefore, concise and current information should be made easily accessible to all high school and elementary school coaches. Organizations such as the National Dairy Council (39), the American Dietetic Association (ADA) (40), and the American College of Sports Medicine (ACSM) (41) could be very instrumental in providing up-to-date information via brief articles, quarterly newsletters, or videotapes that could be shown in health classes. The age of the population that the coaches are working with could be one of the most impressionable stages in life, and correct information presented by a respected adult may help to dispel current myths and misconceptions regarding general and sports nutrition.

The low nutrition knowledge scores of the athletes also supports the idea that nutrition education in the classroom is inadequate, but it is at least hopeful to realize that the scores of the athletes who had taken a nutrition class in high school were higher by an average of 10 points over those that had not taken a course. A primary concern with such low nutrition knowledge scores is that the athletes may not realize the difference between eating healthy foods and eating less nutritious foods and they may be more likely to fall prey to current myths and misconceptions regarding diet. For example, in a study by Short et al. (13), it was
found that many wrestlers believed that if a food was small in size, then it was also low in calories, or that salads are poor choices for dieters because of the bulk. Another common myth heard among athletes is that carbohydrates are fattening, when it is actually what is added to the carbohydrate that may be high in fat. Misconceptions such as these can easily promote poor choices nutritionally.

A similarity between the coaches' competitiveness score and the team's mean competitiveness score was expected to be seen due to the fact that the coaches' attitudes regarding winning and competition could easily influence the attitudes of the athletes. This, however, was not found to exist with this population.

The findings with regard to the competitiveness questionnaire were very clear. The mean score of the wrestlers was 58.4 out of a possible 65 points (90%). In previous studies validating the Sports Orientation Questionnaire (32,38), the average score for competitiveness for this age of athlete was 47 (72%), almost 20% lower than the scores of the present population. The question is whether or not this population really is extremely competitive in nature, or whether the questionnaire was ineffective for this group? Two previous studies mentioned with regard to the SOQ (32,38) suggested that the competitiveness scores were the strongest discriminators between students who are competitive sports participants and those who are not. In the study conducted by Gill and Deeter, the mean competitiveness score for the high school sport participants was 54.2 versus 42.2 for the nonparticipating peers (38). The findings from Gill and Deeter (38), do suggest that the group of wrestlers participating in the current study are highly competitive in nature, which may in part be due to the personality requirements of the sport. In order to succeed in wrestling, one must be very focused and willful, lending to a personality which would almost require one to be competitive (37).

Competitiveness levels were found to increase with increasing years of wrestling participation, but no other variables were found to correlate with increasing levels of competitiveness in this population. Due to the overall high
scores of competitiveness, it was difficult to determine whether the attitude of the coaches had any effect on their teams.

Hypotheses included the expectation that a low nutrition knowledge score would correlate with an increased incidence of weight cutting, but no significant relationship was found to exist. The overall reported occurrence of weight cutting for competition was lower than expected in this population. Another study looking at the occurrence of weight cutting and weight loss methods in 63 college wrestlers and 368 high school wrestlers found that an average 41% of college wrestlers and 23% of high school wrestlers reported cutting weight weekly for competitions (1). The suspected reasons for the lower occurrence in the present population are: 1) a potential lack of honesty on the part of the wrestlers when completing the questionnaire, 2) the coaches who agreed to participate in the study did not encourage weight cutting for the athletes, 3) weight records are not kept and analyzed by the coaches, so they are unaware of the weight loss in their athletes, and 4) the coaches who did not choose to participate in the study may have had a higher occurrence of weight cutting and did not wish to participate due to this fact. According to a number of the participating coaches in this study, there were certain coaches within the league that may have chosen not to participate due to the weight cutting practices of the team, and the support of weight cutting by those coaches. After working with the high school wrestling population, one realizes that the need for revised weight cutting or minimal weight guidelines are desperately needed. Many states have begun revising their guidelines due to the preponderance of weight cutting occurring in the adolescent population. Wisconsin has now set guidelines that are considered to be the strictest in the country, requiring the determination of a minimum weight class for each wrestler based on 7% body fat (42). Naturally lean wrestlers who are less than 7% body fat are required to wrestle at a weight class above, not below, their current weight. Most states are very lenient at this point with regard to weight class and minimum body fat percent, but it is becoming increasingly important that these guidelines be changed and improved, and most importantly, strictly
adherred to. Weight cutting is not a healthy practice, especially for adolescents, and its practice needs to be controlled in the wrestling population.

There were many limitations with regard to the information gained from this study. To begin with, it is suspected that a number of the schools who did not choose to participate, may have been able to provide better insight into the weight-cutting that is speculated to occur within the sport of wrestling. The teams that did agree to participate may not have consisted of a high weight-cutting population. Also, when asked to keep consistent weight records at the beginning of the season, all of the participants agreed, but very few kept records, and often if records were kept throughout the season, they were unable to be located when asked for. An additional limitation of the study was the use of the Sport Orientation Questionnaire (SOQ) with this population. It appears from the results of the competitiveness results, that a more sensitive indicator may have been more useful, although few such questionnaires currently exist. Lastly, this particular population is difficult to work with due to age and responsibility level, as well as the lack of current information available regarding weight cutting and the long-term effects when practiced by adolescents.

If this study were to be re-done, and all of the same information was the goal, it would be very important to enlist help at each high school in order to keep track of the weights, as well as to help with the various paperwork that is necessary. A high school student from each school who would be willing to help in this manner would be the best choice due to the various locations of the schools. Also, it would be very beneficial to do pre-season and mid-season measures of competitiveness in order to see if, as the author would hypothesize, the levels of competitiveness increase as the season progresses.

From the results of the current study in combination with the literature available, it appears that there are numerous changes that need to be made with regard to the high school wrestling population. In summary, some of the changes that need to be made in the wrestling arena include:

1. Safe minimum weight guidelines for each state.

2. Better educational resources for coaches.
* 3. Better nutrition courses for high school athletes and students, with emphasis on sports nutrition and healthy weight maintenance.

* 4. Better control of weight loss and weight tracking in the adolescent wrestling population.

* Related to findings of current research.

** A Resource Guide for Coaches has been compiled in the appendices area of this thesis.
VI. Summary and Conclusions

Twelve Mid-Willamette Valley High School wrestling teams participated in this study. The purpose of this study was to examine the interrelationships of nutrition knowledge, competitiveness, and severity of weight cutting in 180 high school wrestlers and 29 coaches. The study included the completion of nutrition knowledge and sport orientation questionnaires and keeping track of the wrestlers' weights throughout the season. Questionnaires were completed in January of 1993, which was early to mid-season for the teams. Topics covered in the nutrition knowledge questionnaire included: nutrient composition of foods, vitamins and minerals in athletic performance, general nutrition in athletics, pre-competition nutritional practices, and common myths in sports nutrition. The Sport Orientation Questionnaire (SOQ) measures three separate but related components of sport orientation: competitiveness, win orientation, and goal orientation. Competitiveness was the primary focus within this particular study. Possible factors affecting the levels of nutrition knowledge, competitiveness, and severity of weight cutting, as well as the interrelationships of the above three measures, were to be examined. Some of the possible factors that were examined included: year in school, years of participation in wrestling, coaches levels of competitiveness and nutrition knowledge, and inclination to use supplements for performance gains. A total of 180 wrestlers and 29 coaches and assistant coaches participated in the study.

The primary significant findings included:
1. The mean nutrition knowledge scores were very low for both the athletes and the coaches (53.9% and 67% respectively).
2. The mean nutrition knowledge scores increased significantly with year in school for the athletes.
3. The coaches scored higher as a whole than the wrestlers on the nutrition knowledge test.
4. The nutrition knowledge levels of the coaches increased significantly with the number of years coaching.

5. There was a significant similarity between the head coaches nutrition knowledge score and the teams' mean score.

6. This group of wrestlers and coaches was found to be highly competitive with mean scores of 58.5 and 59.4, respectively, out of a possible 65 points.

7. The level of competitiveness was found to significantly increase with the number of years of participation in the sport for the wrestlers.

8. No significant interrelationship was seen between the level of competitiveness and amount of weight reportedly lost before competition.

9. No significant similarity was seen between the coaches’ level of competitiveness and the teams' mean competitiveness level.

There were numerous problems encountered throughout this study, but with 20/20 hindsight, there are many factors that could be taken into consideration prior to the actual data collection which could make a similar study much simpler and more effective. To begin with, more people would be needed in order to closely monitor the weight records of the athletes and to assure their completion. Also, more information given to the coaches prior to the study regarding the importance of the weight records may have made a difference. Most coaches were very cooperative with all aspects of the study until it came time to collect the weight records.

The results of this study strongly indicate that more emphasis on nutrition education is needed in the high school setting for both students and the athletic coaches. It is apparent that if given the chance to learn correct nutrition information, most coaches will do so, but with so little time available, few take the time to look up or research current information regarding sports nutrition. This unfortunately promotes the continuation of many common myths and misconceptions in the wrestling community.
References


41. American College of Sports Medicine, 401 West Michigan St., Indianapolis, Indiana 46202-3233.
APPENDICES
Appendix 1

Position Statements of the American College of Sports Medicine (ACSM) and the American Medical Association (AMA) regarding weight loss in the sport of wrestling.
American College of Sports Medicine

Position Stand on

Weight Loss In Wrestlers

Despite repeated admonitions by medical, educational and athletic groups (2,8,17,22,33), most wrestlers have been inculcated by instruction or accepted tradition to lose weight in order to be certified for a class that is lower than their preseason weight (34). Studies (34,40) of weight losses in high school and college wrestlers indicate that from 3-20% of the preseason body weight is lost before certification or competition occurs. Of this weight loss, most of the decrease occurs in the final days or day before the official weigh-in (34,40) with the youngest and/or lightest members of the team losing the highest percentage of their body weight (34). Under existing rules and practices, it is not uncommon for an individual to repeat this weight losing process many times during the season because successful wrestlers compete in 15-30 matches/year (13).

Contrary to existing beliefs, most wrestlers are not "fat" before the season starts (35). In fact, the fat content of high school and college wrestlers weighing less than 190 pounds has been shown to range from 1.6 to 15.1 percent of their body weight with the majority possessing less than 8% (14,28,31). It is well known and documented that wrestlers lose body weight by a combination of food restriction, fluid deprivation and sweating induced by thermal or exercise procedures (20,22,34,40). Of these methods, dehydration through sweating appears to be the method most frequently chosen.

Careful studies on the nature of the weight being lost show that water, fats and proteins are lost when food restriction and fluid deprivation procedures are followed (10). Moreover, the proportionality between these constituents will change with continued restriction and deprivation. For example, if food restriction is held constant when the volume of fluid being consumed is decreased, more water will be lost from the tissues of the body than before the fluid restriction occurred. The problem becomes more acute when thermal or exercise dehydration occurs because electrolyte losses will accompany the water losses (16). Even when 1-5 hours are allowed for purposes of rehydration after the weigh-in, this time interval is insufficient for fluid and electrolyte homeostasis to be completely reestablished (11,37,39,40).

Since the "making of weight" occurs by combinations of food restriction, fluid deprivation and dehydration, responsible officials should realize that the single or combined effects of these practices are generally associated with 1) a reduction in muscular strength (4,15,30); 2) a decrease in work performance times (24,26,27,30); 3) lower plasma and blood volumes (6,7,24,27); 4) a reduction in cardiac functioning during sub-maximal work conditions which are associated with higher heart rates (1,19,23,24,27), smaller stroke volumes (27), and reduced cardiac outputs (27); 5) a lower oxygen consumption, especially with food restriction (15,30); 6) an impairment of thermoregulatory processes (3,9,24); 7) a decrease in renal blood flow (21,25) and in the volume of fluid being filtered by the kidney (21); 8) a depletion of liver glycogen stores (12); and 9) an increase in the amount of electrolytes being lost from the body (6,7,16).

Since it is possible for these changes to impede normal growth and development, there is little physiological or medical justification for the use of the weight reduction methods currently followed by many wrestlers. These sentiments have been expressed in part within Rule 1, Section 3, Article 1 of the Official Wrestling Rule Book (18) published by the National Federation of State High School Associations which states, "The Rules Committee recommends that individual state high school associations develop and utilize an effective weight control program which will discourage severe weight reduction and/or wide variations in weight, because this may be harmful to the competitor...". However, until the National Federation of State High School Associations defines the meaning of the terms "severe" and "wide variations," this rule will be ineffective in reducing the abuses associated with the "making of weight."

Therefore, it is the position of the American College of Sports Medicine that the potential health hazards created by the procedures used to "make weight" by wrestlers can be eliminated if state and national organizations will:

1) Assess the body composition of each wrestler several weeks in advance of the competitive season (5,14,28,31,38). Individuals with a fat content less than five percent of their certified body weight should receive medical clearance before being allowed to compete.

2) Emphasize the fact that the daily caloric requirements of wrestlers should be obtained from a balanced diet and determined on the basis of age, body surface area, growth and physical activity levels (29). The minimal caloric needs of wrestlers in high schools and colleges will range from 1200 to 2400 KCal/day (32); therefore,
it is the responsibility of coaches, school officials, physicians and parents to discourage wrestlers from securing less than their minimal needs without prior medical approval.

3) Discourage the practice of fluid deprivation and dehydration. This can be accomplished by:
   a. Educating the coaches and wrestlers on the physiological consequences and medical complications that can occur as a result of these practices.
   b. Prohibiting the single or combined use of rubber suits, steam rooms, hot boxes, saunas, laxatives, and diuretics to "make weight."
   c. Scheduling weigh-ins just prior to competition.
   d. Scheduling more official weigh-ins between team matches.
4) Permit more participants/team to compete in those weight classes (119-145 pounds) which have the highest percentages of wrestlers certified for competition (J6).
5) Standardize regulations concerning the eligibility rules at championship tournaments so that individuals can only participate in those weight classes in which they had the highest frequencies of matches throughout the season.
6) Encourage local and county organizations to systematically collect data on the hydration state (39,40) of wrestlers and its relationship to growth and development.
Wrestling and Weight Control

Wrestling is an excellent sport, especially for high school students. It offers personal combative experiences to competitive-minded youths of any height and weight. It demands total readiness: superb mental and physical strength, stamina, and skill. Weight classifications provide the structure for safe and equitable competition. Weight control maintains the wrestler’s readiness for competition at an appropriate (certified) weight level.

The recent rapid growth in popularity of interscholastic wrestling—participation has nearly tripled since 1960—is testimony that most schools, communities, and parents share the views of the AMA Committee on the Medical Aspects of Sports that it is a worthy sport. However, wrestling’s good name has been tainted by charges that ill-advised practices of weight control are in use.

Allegedly, some wrestling coaches have (1) required growing boys to attain and maintain for the season certified weights considerably below their optimum weights and (2) advised boys to lose weight suddenly by crash diets and/or by “drying out” (dehydration) to retain eligibility at such certified weights. After the weigh-in and before the contest, these boys would then attempt to regain as much weight as possible.

Reasons offered for such tampering with the youths’ nutritional state include some that are less acceptable than others:

- To balance the squad’s representation in all weight classes;
- To gain advantage by getting a boy pitted against a lighter opponent;
- Because periodic weigh-ins make wrestlers resort to such practices;
- Because the boy’s weight was not his best weight;
- Because “everyone does it so I have to also”;
- Because “it really doesn’t hurt anyone.”

The predominant response was that the problem was one of education, to be approached in a manner that would reaffirm the values attributed to wrestling and key on the professional standards of most high school coaches. What a coach wants is to make each candidate the best possible wrestler; it would be illogical to assume that any coach’s interests could be dedicated to anything but this basic goal. Coaches must appreciate that artificial approaches which enable a boy to qualify for a weight division below that in which he rightfully belongs do not contribute to that dedication.

Since in high school the wrestling program is justified on educational grounds and the candidate is often a neophyte athlete, indiscriminate weight control practices have several implications. If weight loss is excessive, the boy’s competitive abilities are impaired. If his weight loss is contrived to circumvent a regulation, his ethics have been compromised. If he has an unsuspected metabolic problem, or if the weight reduction scheme is extreme, his health could be seriously affected.
Weight Control Perspectives

The A.M.A. Committee on the Medical Aspects of Sports offers the following responses to the questions that have been raised:

**What Are the Hazards of indiscriminate and Excessive Weight Reduction?**

It should be recognized initially that neglecting to provide for a preparticipation medical examination is itself a major hazard—in all sports. With the assistance of a health history, such an examination would yield a good understanding of a candidate's current health status prior to imposing on him the rigors of athletic training.

In wrestling, abuses in weight control primarily stem from dehydration measures, including, but not limited to, hot boxes, rubberized apparel, and induced vomiting. The body's water is the only weight that is easily lost and can be lost in a day or two. However, water is a nutrient. In fact, water deficiency causes premature fatigue, and eventually clinical illness, more rapidly than deficiency of any other nutrient. If to a water deficiency other deficiencies are added, such as those associated with prolonged semistarvation diets, unbalanced diets, or excessive sweating, the deleterious effects are even more marked.

Any form of dehydration is self-defeating to a wrestler. Even with minimal dehydration (eg, sudden loss of 3% body weight), performance can be impaired. The impairment may not be significant, especially in a brief match, but the effect on the aspiring wrestler's performance potential should concern him. Under tournament conditions, where energy reserves become more significant, premature fatigue from any cause sacrifices the wrestler's acquired talents when they count most.

It is sufficient to attack indiscriminate weight control plans solely, on performance impairment hazards, for, if this physiological threat is appreciated, clinically hazardous extremes will not be approached.

**How Much Can a Wrestler Lose Safely?**

Professional judgment would best be exercised if coach and physician take as their objective the boy's effective weight level (the weight level at which the boy will perform best) instead of a minimal weight figure, which invariably invites trouble. The limits of safe weight control practices are not readily definable by formula or edict. Even if science could compute the answer, additional information would need to be supplied: Should the candidate lose weight? How does he plan to lose weight? What will he be doing while or just after losing weight?

**What Are Defensible Means for Losing Weight?**

For any athlete there is no alternative to (1) a balanced diet at a sustaining caloric level; (2) adequate fluid intake; and (3) high-energy output for attaining and maintaining an effective competitive weight. In determination of the need for weight modification, consideration must be given to the quality of one's existing weight (body composition). Sophisticated methods of calculating body composition can be used, but assessment from personal examination is more valid than a height-weight table. The desired modification of weight should be accomplished over an extended period, so that the change in body composition occurs without loss in activity capability. In fact, it is possible for a young boy to add muscle and lose fat without change in weight.

Only the loss of excess body fat is desirable weight loss; loss of body fluids is "artificial" weight reduction and lasts only until replenishment occurs in general accordance with thirst. The only means for losing excess body fat is to take in fewer calories than are used up by the body (negative caloric balance). A negative caloric balance is defensible only if the nutrients and energy reserves from the diet remain sufficient to meet the body's needs during a wrestler's strenuous training program. Generally, a caloric intake averaging less than 3,000 calories daily could not meet this criterion.

Beyond a sound nutritional base, consideration should be given to several factors bearing on qualification for competition. Short intermittent efforts are fueled by readily available glycogen; glycogen is best stored by reducing energy expenditure 24 to 48 hours prior to all-out performance while the diet is over balanced with carbohydrates. More prolonged high-level performances, as during training and tournaments, necessitate conversion of fatty acids to fuel because the amount of glycogen that can be stored is limited. Although loss of excess fat is a desirable goal, maintenance of sufficient fat reserves (7%-10% of body weight) is another aspect of defensible weight control.

**What Weight-in Plan Would Best Serve the Purpose Intended?**

Effective weight of wrestling candidates can best be assessed through a natural approach:

1. Educate youth interested in athletics as to the importance of periodic medical examinations and the advantages of a general, year-round conditioning program for cardiovascular-pulmonary endurance, muscular fitness, and nutritional readiness.

2. Building on this orientation, assist any aspiring wrestler in an intensive conditioning program related to the demands of wrestling for at least four weeks, preferably six, without emphasis on weight level.

3. At the end of this period and without altering his daily training routine, take his weight in a pre-breakfast, post-micturition state.

4. Consider this weight his minimal effective weight for competition as well as certification purposes.

5. Educate the boy and his parents in the concept of defensible weight control to avert fluctuation from his effective weight level.

An attempt to attain and maintain an effective weight level lower than that determined by this process would work considerable hardship on the boy and would be an artificial approach. Since athletic readiness involves the psyche—motivation, interest, and confidence—as well as the physique, burdening an athlete with a season of struggle to qualify artificially for competition does his competitive chances no service.

JAMA, Aug 14, 1967 • Vol 201. No 7
Comment
A "magic number" for weight in competition should not overshadow skill, yet arbitrariness in this regard seems to be one of the factors in negating a positive concept of weight control. If a safe and equitable range of weight classes could be established in which an individual might compete during one season without further proof of weight—such as the boy's minimal effective weight level plus the two classes above—many of the temptations to tamper with weight control procedures would be removed.

Fluctuation of weight beyond such a range within one season would be of no advantage to the boy. Such freedom of selection would give the coach flexible prerogatives of team management comparable to those in other sports. Indeed, judicious management based on available personnel and their individual characteristics would prevent obvious mismatches. Direct responsibility would be taken from rules-makers and attending physicians and returned to those whose professional task it is to prepare individual athletes for competition.

Respect among coaches for these concepts would subordinate rules and regulations governing weight control to make wrestling athlete-oriented rather than scales-oriented. Rules and regulations governing weight classifications will always be necessary to structure the sport and tournament qualifications as well as to emphasize defensible management of young athletes. But beyond condemning dehydration techniques, rules-makers have an impossible role in attempting to regulate against all unprofessional approaches. The control of abuses is considered an educational task that will have the support of competent coaches.

References

Training on Figs, Keeping on Toes.—The earliest Greek athlete of whose special diet we are told anything is Charmis of Sparta, who is said to have trained on dried figs. He won the 200 yards in the Olympic games of 666 B.C. and the tradition would seem to indicate that as a sprinter he found the extra sugar in fruit useful. Pausanias in the second century A.D. says that the first athlete to train on a diet mainly of meat was Dromeus of Ephesus, a long-distance runner of about 480 B.C. More probable is the account which attributes this innovation to Eurymanes of Samos, a heavyweight of the previous century. A curiosity about this tradition is that he is said to have acted on the advice of his trainer Pythagoras, the mathematician and philosopher, and Pythagoras is generally supposed to have been a vegetarian. But a meat diet for heavyweights probably went back even farther than this, if we are justified in taking any notice of the anecdotes about the eating feats of Milo of Croton. This man was the outstanding figure in the history of Greek athletics. He won the wrestling [bouts] at seven successive Olympiads and 26 victories in other great Panhellenic festivals. He seems to have been something of a "character", and stories gathered round his name. . . . His daily diet is said to have consisted of 20 lb of bread, 20 lb of meat and 18 pints of wine. Some wag, obviously determined to produce a Milo story to end all Milo stories, invented the legend that he once carried a 4-year-old bull round the stadium at Olympia, killed it with a single blow of his fist and then ate it all in one day. . . . The temptation to eat large quantities of meat must have been particularly strong for competitors in the fighting events, where sheer body-weight counted so much. It is not surprising that moralists sometimes denounced this overeating. Their attitude was perhaps not entirely untainted with envy; most Greeks had less meat than they would have wished.—Harris, R.A.: Nutrition and Physical Performance, in Proceedings of the Nutrition Society 25:87-90, 1966.
Appendix 2

Questionnaires

1. Nutrition Knowledge Questionnaire: correct responses have been marked with an X or enlarged and underlined, as appropriate, for this appendix.
1. Please check the foods you believe to be a good source of iron.

- **X** liver (3 ounces)  
- **X** prune juice (1/2 cup)  
- **_** oranges (1 medium)  
- **_** milk (1 cup)  
- **_** raisins (2 Tbsp.)  
- **X** molasses (1 Tbsp.)  
- **_** french fries (10 average)  
- **X** oysters (6)  
- **_** cottage cheese (1/2 cup)  
- **X** baked beans (1/2 cup)  
- **_** dried apricots (4 halves)  
- **_** bananas (1 medium)  

2. Please check which of the following beverages you would recommend for athletes during either practice or competition.

- **_** soda pop  
- **X** orange juice, diluted  
- **_** beer  
- **_** coffee  
- **X** water  
- **_** Tang  
- **_** Gatorade  
- **_** milk, whole  
- **_** tea  

3. Which of these foods do you consider to be complex carbohydrate foods?

- **_** apples  
- **X** bread, whole wheat  
- **_** fish  
- **_** honey  
- **_** lima beans  
- **_** low-fat yogurt  
- **X** pancakes  
- **_** peanut butter  
- **_** potatoes  
- **X** raisin bran  
- **_** spaghetti  

4. Please check the foods that you believe are high in salt.

- **_** canned vegetables  
- **_** cheese  
- **X** fresh fruit  
- **_** dry cereal  
- **X** ham  
- **_** jelly  
- **_** lemonade  
- **X** luncheon meat  
- **_** milk  
- **_** mustard  
- **_** olives  
- **_** peanut butter  
- **_** pickles  
- **_** canned soups  

5. Which of these foods are sources of low-fat protein?

- **X** potato chips  
- **X** non-fat milk  
- **X** baked chicken  
- **_** bacon  
- **X** low-fat cottage cheese  
- **_** sausage  
- **X** kidney beans  
- **X** baked halibut  
- **_** ham  
- **_** steak  
- **X** tuna, water packed  
- **_** green peas  
- **X** macaroni  
- **_** swiss cheese  

6. The three sample meals below have been used as pre-competition meals. Please indicate by a check which meal you would recommend eating as the best pre-competition meal.

**Meal A**
- bacon-2 slices  
- fried eggs-1  
- cheddar cheese (2oz.)  
- Whole wheat toast-1 slice  
- butter- 1 tsp.  
- coffee (8 oz.)  

**Meal B**
- T-bone steak (8 oz.)  
- scrambled eggs-2  
- Whole wheat toast-1 slice  
- butter- 1 tsp.  
- whole milk (8 oz.)  

**Meal C**
- orange juice (8 oz)  
- poached eggs-2  
- sliced peaches/skim  
- milk
6a. Please discuss briefly the reason for your meal choice in the previous question.

6b. How soon before competition should athletes finish a meal?
   ______ 1/2 hour
   ______ 1 hour
   ______ 2 hours
   ______ 2 1/2-3 hours
   ______ 6 hours
   ______ other

7. Listed below are some statements concerning vitamins, minerals, and athletic performance. Please indicate whether you agree with each statement, disagree, or don't know. (Circle one number for each statement.)

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON'T KNOW</th>
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</thead>
<tbody>
<tr>
<td>a. Vitamins supply energy for the body.</td>
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<tr>
<td>b. Vitamin megadoses may be harmful.</td>
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<td>c. Magnesium supplements help avoid muscle cramping.</td>
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<tr>
<td>d. Endurance athletes should pay special attention to consuming foods high in iron.</td>
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<tr>
<td>e. Vitamins contribute significantly to body structure (increases in muscle size, for example.)</td>
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<td>f. Vitamin E supplementation improves physical performance.</td>
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<tr>
<td>g. Most athletes need extra vitamins and minerals beyond what they receive in a balanced daily diet.</td>
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<td>2</td>
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8. Some statements often made concerning nutrition and athletics are listed below. Please indicate, by circling a number, how strongly you agree or disagree with each one.

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<th>STATEMENT</th>
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<tr>
<td>a. Eating a candy bar right before exercise will give you quick energy.</td>
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<td>b. Athletes need more calories than non-athletes.</td>
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<td>c. Exercise is not useful in weight reduction because it uses so few calories.</td>
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<td>d. Water is the best fluid replacement for athletes before, during and after practice or competition.</td>
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<td>e. Carbohydrate loading may be of benefit to a select group of athletes.</td>
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<td>f. All athletes should eat the same amount of food.</td>
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<td>g. Complex carbohydrates are the preferred dietary fuel for the active individual.</td>
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<td>h. Athletes and others who exercise regularly need extra protein.</td>
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<td>i. Alcohol has been shown to be ineffective as a means of increasing performance capacity.</td>
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<td>j. Protein supplements are especially useful for weight lifters.</td>
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<td>k. A healthy diet should have 30% of its total calories coming from fat, 55-60% from carbohydrates and 12% from protein.</td>
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<td>l. Fats are an important energy source during mild to moderate levels of exercise.</td>
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<td>m. Salt tablets are not necessary even during strenuous exercise and excessive sweating.</td>
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<td>n. Most vegetarian athletes can't get enough protein.</td>
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<td>o. Bee pollen aids the performance of endurance athletes.</td>
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<td>p. A balanced diet consisting of a variety of foods from the Basic Five Food groups is the key for good health and optimal athletic performance.</td>
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</table>
q. The amount of calories an athlete needs depends on how active she is.  

r. Fructose is a better source of carbohydrate energy than glucose because it is metabolized more efficiently.  

s. Honey is not nutritionally superior to sugar.  

t. Fast foods (McDonalds, etc.) are not nutritious and should be avoided by athletes.  

u. Gatorade and other commercial thirst quenchers are not good beverages for athletes because they contain excess sugar and salt.

9. Following are some statements regarding pre-game/competition nutritional practices. Please indicate whether you agree, disagree, or don't know. Please circle one number for each statement.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk consumed before an athletic event causes cotton mouth, cuts speed and wind, and causes stomach upset.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Steak and eggs for breakfast makes a good pre-competition meal.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Whole milk is not recommended before competition.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Caffeine containing beverages are beneficial as a pre-competition beverage.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>A pre-competition meal should be small (500-900 calories) and should be eaten 2-3 hours before competition</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Liquid pre-game meals are preferable to solid meals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
10. Following are some statements regarding current health issues in athletics. Please indicate whether you agree, disagree, or don't know. Please circle one number for each statement.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1-2 pounds per week is considered a safe rate of weight loss.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. Lack of thirst is a reliable indication that the body is well hydrated.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. Two common side effects of anabolic steroid use are testicular atrophy and impotence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Amino acid supplements provide larger amounts of amino acids to the body than are found in food.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. Exercise is the best means of weight loss and weight control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
2. Nutrition Knowledge Questionnaire: summary of 29 coaches responses. The numbers given next to each possible answer represent the number of coaches who chose that particular answer.
1. Please check the foods you believe to be a good source of iron.

- 27. liver (3 ounces)
- 0. oranges (1 medium)
- 11. raisins (2 Tbsp.)
- 0. french fries (10 average)
- 4. cottage cheese (1/2 cup)
- 7. dried apricots (4 halves)

- 8. prune juice (1/2 cup)
- 9. milk (1 cup)
- 2. molasses (1 Tbsp.)
- 6. oysters (6)
- 6. baked beans (1/2 cup)
- 2. bananas (1 medium)

2. Please check which of the following beverages you would recommend for athletes during either practice or competition.

- 0. soda pop
- 9. orange juice, diluted
- 1. coffee
- 29. water
- 14. Gatorade

- 0. beer
- 7. mineral water
- 3. tea
- 0. milk, whole

3. Which of these foods do you consider to be complex carbohydrate foods?

- 3. apples
- 13. lima beans
- 21. pancakes
- 20. potatoes
- 0. sausage

- 25. bread, whole wheat
- 0. honey
- 0. low-fat yogurt
- 10. raisin bran
- 28. spaghetti

4. Please check the foods that you believe are high in salt.

- 22. canned vegetables
- 17. cheese
- 0. fresh fruit
- 26. ham
- 0. lemonade

- 24. catsup
- 2. dry cereal
- 0. fresh vegetables
- 1. jelly
- 24. luncheon meat

- 0. milk
- 15. olives
- 23. pickles

- 26. canned soups

5. Which of these foods are sources of low-fat protein?

- 0. potato chips
- 22. baked chicken
- 16. low-fat cottage cheese
- 22. kidney beans
- 0. ham

- 17. non-fat milk
- 0. bacon
- 0. sausage
- 21. baked halibut
- 2. steak

- 6. green peas
- 4. macaroni

- 1. swiss cheese

6. The three sample meals below have been used as pre-competition meals. Please indicate by a check which meal you would recommend eating as the best pre-competition meal.

Meal A. 0
- bacon-2 slices
- fried eggs-1
- cheddar cheese (2 oz.)
- Whole wheat toast-1 slice
- butter-1 tsp.
- coffee (8 oz.)

Meal B. 0
- T-bone steak (8 oz.)
- scrambled eggs-2
- Whole wheat toast-1 slice
- butter-1 tsp.
- whole milk (8 oz.)

Meal C. 29
- orange juice (8 oz.)
- poached eggs-2
- sliced peaches/skim
- milk
6a. Please discuss briefly the reason for your meal choice in the previous question.

6b. How soon before competition should athletes finish a meal?

- 0-1/2 hour
- 1 hour
- 2 hours
- 3-6 hours
- 8 hours
- Other

7. Listed below are some statements concerning vitamins, minerals, and athletic performance. Please indicate whether you agree with each statement, disagree, or don’t know. (Circle one number for each statement.)

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON’T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Vitamins supply energy for the body.</td>
<td>1-4</td>
<td>2-20</td>
<td>3-5</td>
</tr>
<tr>
<td>b. Vitamin megadoses may be harmful.</td>
<td>1-28</td>
<td>2-1</td>
<td>3-0</td>
</tr>
<tr>
<td>c. Magnesium supplements help avoid muscle cramping.</td>
<td>1-4</td>
<td>2-15</td>
<td>3-10</td>
</tr>
<tr>
<td>d. Endurance athletes should pay special attention to consuming foods high in iron.</td>
<td>1-16</td>
<td>2-5</td>
<td>3-8</td>
</tr>
<tr>
<td>e. Vitamins contribute significantly to body structure (increases in muscle size, for example.)</td>
<td>1-10</td>
<td>2-14</td>
<td>3-5</td>
</tr>
<tr>
<td>f. Vitamin E supplementation improves physical performance.</td>
<td>1-2</td>
<td>2-13</td>
<td>3-14</td>
</tr>
<tr>
<td>g. Most athletes need extra vitamins and minerals beyond what they receive in a balanced daily diet.</td>
<td>1-5</td>
<td>2-23</td>
<td>3-1</td>
</tr>
</tbody>
</table>

8. Some statements often made concerning nutrition and athletics are listed below. Please indicate, by circling a number, how strongly you agree or disagree with each one.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>S A</th>
<th>A D</th>
<th>D S</th>
<th>D D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Eating a candy bar right before exercise will give you quick energy.</td>
<td>1-0</td>
<td>2-4</td>
<td>3-10</td>
<td>4-14</td>
</tr>
<tr>
<td>b. Athletes need more calories than non-athletes.</td>
<td>1-15</td>
<td>2-12</td>
<td>3-2</td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td>5-0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STATEMENT

c. Exercise is not useful in weight reduction because it uses so few calories. 1-1 2-0 3-2 4-26 5-0
d. Water is the best fluid replacement for athletes before, during and after practice or competition. 1-21 2-7 3-0 4-1 5-0
e. Carbohydrate loading may be of benefit to a select group of athletes. 1-16 2-12 3-0 4-1 5-0
f. All athletes should eat the same amount of food. 1-0 2-0 3-4 4-25 5-0
g. Complex carbohydrates are the preferred dietary fuel for the active individual. 1-16 2-11 3-0 4-0 5-2
h. Athletes and others who exercise regularly need extra protein. 1-0 2-13 3-13 4-2 5-1
i. Alcohol has been shown to be ineffective as a means of increasing performance capacity. 1-23 2-3 3-0 4-1 5-2
j. Protein supplements are especially useful for weight lifters. 1-4 2-5 3-12 4-2 5-6
k. A healthy diet should have 30% of its total calories coming from fat, 55-60% from carbohydrates and 12% from protein. 1-1 2-11 3-8 4-8 5-1
l. Fats are an important energy source during mild to moderate levels of exercise. 1-0 2-11 3-10 4-6 5-2
m. Salt tablets are not necessary even during strenuous exercise and excessive sweating. 1-15 2-8 3-4 4-1 5-1
n. Most vegetarian athletes can’t get enough protein. 1-1 2-1 3-12 4-12 5-3
o. Bee pollen aids the performance of endurance athletes. 1-0 2-0 3-12 4-1 5-16
p. A balanced diet consisting of a variety of foods from the Basic Five Food groups is the key for good health and optimal athletic performance. 1-19 2-6 3-3 4-1 5-0
The amount of calories an athlete needs depends on how active they are. 
Fructose is a better source of carbohydrate energy than glucose because it is metabolized more efficiently.
Honey is not nutritionally superior to sugar.
Fast foods (McDonalds, etc.) are not nutritious and should be avoided by athletes.
Gatorade and other commercial thirst quenchers are not good beverages for athletes because they contain excess sugar and salt.

9. Following are some statements regarding pre-game/competition nutritional practices. Please indicate whether you agree, disagree, or don’t know. Please circle one number for each statement.

a. Milk consumed before an athletic event causes cotton mouth, cuts speed and wind, and causes stomach upset. 

b. Steak and eggs for breakfast makes a good pre-competition meal.

c. Whole milk is not recommended before competition.

d. Caffeine containing beverages are beneficial as a pre-competition beverage.

e. A pre-competition meal should be small (500-900 calories) and should be eaten 2-3 hours before competition.

f. Liquid pre-game meals are preferable to solid meals.
10. Following are some statements regarding current health issues in athletics. Please indicate whether you agree, disagree, or don't know. Please circle one number for each statement.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1-2 pounds per week is considered a safe rate of weight loss.</td>
<td>1-28</td>
<td>2-1</td>
<td>3-0</td>
</tr>
<tr>
<td>b. Lack of thirst is a reliable indication that the body is well hydrated.</td>
<td>1-6</td>
<td>2-22</td>
<td>3-1</td>
</tr>
<tr>
<td>c. Two common side effects of anabolic steroid use are testicular atrophy and impotence.</td>
<td>1-26</td>
<td>2-1</td>
<td>3-2</td>
</tr>
<tr>
<td>d. Amino acid supplements provide larger amounts of amino acids to the body than are found in food.</td>
<td>1-9</td>
<td>2-12</td>
<td>3-8</td>
</tr>
<tr>
<td>e. Exercise is the best means of weight loss and weight control.</td>
<td>1-26</td>
<td>2-3</td>
<td>3-0</td>
</tr>
</tbody>
</table>
3. Nutrition Knowledge Questionnaire: summary of 180 high school wrestler's responses. The numbers given next to each possible answer represent the number of wrestlers who chose that particular answer.
1. Please check the foods you believe to be a good source of iron.

- Liver (3 ounces)
- Oranges (1 medium)
- Raisins (2 Tbsp.)
- French fries (10 average)
- Cottage cheese (1/2 cup)
- Dried apricots (4 halves)

- Prune juice (1/2 cup)
- Milk (1 cup)
- Molasses (1 Tbsp.)
- Tomato, catsup
- Fat-free milk
- Green peas

2. Please check which of the following beverages you would recommend for athletes during either practice or competition.

- Soda pop
- Orange juice, diluted
- Coffee
- Water
- Gatorade

- Beer
- Mineral water
- Tang
- Tea
- Non-fat milk

3. Which of these foods do you consider to be complex carbohydrate foods?

- Apples
- Fish
- Beans
- Pancakes
- Sausage

- Bread, whole wheat
- Honey
- Fat-free cottage cheese
- Spaghetti

4. Please check the foods that you believe are high in salt.

- Canned vegetables
- Cheese
- Fresh fruit
- Ham
- Olives

- Catsup
- Dry cereal
- Luncheon meat
- Peanut butter
- Canned soups

5. Which of these foods are sources of low-fat protein?

- Potato chips
- Baked chicken
- Low-fat cottage cheese
- Kidney beans
- Tuna, water packed

- Non-fat milk
- Bacon
- Sausage
- Baked halibut
- Swiss cheese

6. The three sample meals below have been used as pre-competition meals. Please indicate by a check which meal you would recommend eating as the best pre-competition meal.

Meal A
- Bacon-2 slices
- Fried eggs-1
- Cheddar cheese (2oz.)
- Whole wheat toast-1 slice
- Butter-1 tsp.
- Coffee (8 oz.)

Meal B
- T-bone steak (8 oz.)
- Scrambled eggs-2
- Whole wheat toast-1 slice
- Butter-1 tsp.
- Whole milk (8 oz.)

Meal C
- Orange juice (8 oz.)
- Whole wheat toast-2 sl.
- Poached eggs-2
- Sliced peaches/ skin
- Fat milk
6a. Please discuss briefly the reason for your meal choice in the previous question.

6b. How soon before competition should athletes finish a meal?

- 7_1/2 hour
- 31_1 hour
- 75_2 hours

70_21/2-3 hours
31_1 hour
11_6 hours
10_other

7. Listed below are some statements concerning vitamins, minerals, and athletic performance. Please indicate whether you agree with each statement, disagree, or don't know. (Circle one number for each statement.)

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>AGREE</th>
<th>DISAGREE</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Vitamins supply energy for the body.</td>
<td>1-116</td>
<td>2-48</td>
<td>3-16</td>
</tr>
<tr>
<td>b. Vitamin megadoses may be harmful.</td>
<td>1-123</td>
<td>2-15</td>
<td>3-42</td>
</tr>
<tr>
<td>c. Magnesium supplements help avoid muscle cramping.</td>
<td>1-35</td>
<td>2-22</td>
<td>3-126</td>
</tr>
<tr>
<td>d. Endurance athletes should pay special attention to consuming foods high in iron.</td>
<td>1-83</td>
<td>2-18</td>
<td>3-79</td>
</tr>
<tr>
<td>e. Vitamins contribute significantly to body structure (increases in muscle size, for example.)</td>
<td>1-82</td>
<td>2-66</td>
<td>3-32</td>
</tr>
<tr>
<td>f. Vitamin E supplementation improves physical performance.</td>
<td>1-39</td>
<td>2-31</td>
<td>3-110</td>
</tr>
<tr>
<td>g. Most athletes need extra vitamins and minerals beyond what they receive in a balanced daily diet.</td>
<td>1-84</td>
<td>2-59</td>
<td>3-37</td>
</tr>
</tbody>
</table>

8. Some statements often made concerning nutrition and athletics are listed below. Please indicate, by circling a number, how strongly you agree or disagree with each one.

<table>
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<tr>
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<th>D S</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Eating a candy bar right before exercise will give you quick energy.</td>
<td>1-35</td>
<td>2-56</td>
<td>3-36</td>
<td>4-47</td>
<td>5-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Athletes need more calories than non-athletes.</td>
<td>1-79</td>
<td>2-62</td>
<td>3-19</td>
<td>4-8</td>
<td>5-12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
c. Exercise is not useful in weight reduction because it uses so few calories. 1-1 2-6 3-35 4-133 5-5

d. Water is the best fluid replacement for athletes before, during and after practice or competition. 1-121 2-42 3-9 4-0 5-5

e. Carbohydrate loading may be of benefit to a select group of athletes. 1-77 2-59 3-9 4-3 5-32

f. All athletes should eat the same amount of food. 1-4 2-4 3-76 4-91 5-5

g. Complex carbohydrates are the preferred dietary fuel for the active individual. 1-77 2-67 3-4 4-2 5-30

h. Athletes and others who exercise regularly need extra protein. 1-59 2-60 3-24 4-5 5-32

i. Alcohol has been shown to be ineffective as a means of increasing performance capacity. 1-120 2-20 3-7 4-19 5-14

j. Protein supplements are especially useful for weight lifters. 1-55 2-53 3-13 4-7 5-52

k. A healthy diet should have 30% of its total calories coming from fat, 55-60% from carbohydrates and 12% from protein. 1-22 2-50 3-24 4-18 5-66

l. Fats are an important energy source during mild to moderate levels of exercise. 1-16 2-53 3-48 4-25 5-38

m. Salt tablets are not necessary even during strenuous exercise and excessive sweating. 1-51 2-47 3-24 4-4 5-54

n. Most vegetarian athletes can't get enough protein. 1-20 2-31 3-41 4-39 5-132

o. Bee pollen aids the performance of endurance athletes. 1-5 2-20 3-14 4-9 5-132

p. A balanced diet consisting of a variety of foods from the Basic Five Food groups is the key for good health and optimal athletic performance. 1-99 2-54 3-5 4-3 5-19
The amount of calories an athlete needs depends on how active s/he is.

Fructose is a better source of carbohydrate energy than glucose because it is metabolized more efficiently.

Honey is not nutritionally superior to sugar.

Fast foods (McDonalds, etc.) are not nutritious and should be avoided by athletes.

Gatorade and other commercial thirst quenchers are not good beverages for athletes because they contain excess sugar and salt.

9. Following are some statements regarding pre-game/competition nutritional practices. Please indicate whether you agree, disagree, or don’t know. Please circle one number for each statement.

A. Milk consumed before an athletic event causes cotton mouth, cuts speed and wind, and causes stomach upset.

B. Steak and eggs for breakfast makes a good pre-competition meal.

C. Whole milk is not recommended before competition.

D. Caffeine containing beverages are beneficial as a pre-competition beverage.

E. A pre-competition meal should be small (500-900 calories) and should be eaten 2-3 hours before competition.

F. Liquid pre-game meals are preferable to solid meals.
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</thead>
<tbody>
<tr>
<td>a. 1-2 pounds per week is considered a safe rate of weight loss.</td>
<td>1-143</td>
<td>2-16</td>
<td>3-21</td>
</tr>
<tr>
<td>b. Lack of thirst is a reliable indication that the body is well hydrated.</td>
<td>1-75</td>
<td>2-74</td>
<td>3-31</td>
</tr>
<tr>
<td>c. Two common side effects of anabolic steroid use are testicular atrophy and impotence.</td>
<td>1-114</td>
<td>2-4</td>
<td>3-62</td>
</tr>
<tr>
<td>d. Amino acid supplements provide larger amounts of amino acids to the body than are found in food.</td>
<td>1-87</td>
<td>2-18</td>
<td>3-75</td>
</tr>
<tr>
<td>e. Exercise is the best means of weight loss and weight control.</td>
<td>1-166</td>
<td>2-6</td>
<td>3-8</td>
</tr>
</tbody>
</table>
4. **Sport Orientation Questionnaire**: the odd numbered questions were designed to measure competitiveness (#1,3,5,7,9,11,13,15,17,19,21,23 & 25).

Win orientation, or importance of winning, was measured by 6 questions: (#2,6,10,14,18 & 22).

Goal orientation was measured by 6 questions also: (4,8,12,16,20 &24).
Sport Orientation Questionnaire:

The following statements describe reactions to sport situations. We want to know how you usually feel about sports and competition. Read each statement and circle the letter that indicates how much you agree or disagree with each statement on the scale: A, B, C, D, or E. There are no right or wrong answers; simply answer as you honestly feel. Do not spend too much time on any one statement. Remember, choose the letter which describes how you usually feel about sports and competition.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Slightly agree</th>
<th>Neither agree nor disagree</th>
<th>Slightly disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am a determined competitor.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>2. Winning is important.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>3. I am a competitive person.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>4. I set goals for myself when I compete.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>5. I try my hardest to win.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>6. Scoring more points than my opponent is very important to me.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>7. I look forward to competing.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>8. I am most competitive when I try to achieve personal goals.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>9. I enjoy competing against others.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>10. I hate to lose.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>11. I thrive on competition.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>12. I try hardest when I have a specific goal.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>13. My goal is to be the best athlete possible.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>14. The only time I am satisfied is when I win.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>15. I want to be successful in sports.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>16. Performing to the best of my ability is very important to me.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>17. I work hard to be successful in sports.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>18. Losing upsets me.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>19. The best test of my ability is competing against others.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>20. Reaching personal performance goals is very important to me.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>21. I look forward to the opportunity to test my skills in competition.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>22. I have the most fun when I win.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>23. I perform the best when I am competing against an opponent.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>24. The best way to determine my ability is to set a goal and try to reach it.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>25. I want to be the best every time I compete.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>
5. Coaches and high school wrestler's general information forms.
Coaches information sheet:

Name of High School you are coaching for: ________________________________

Number of years as a wrestling coach: _______ years

Are you currently a(n): ___ assistant coach ___ head coach

Are you responsible for the nutrition education of the wrestlers during the wrestling season? ___yes ___no

Are you involved in a wrestling camp program? ___yes ___no

If yes, which one? __________________________

Do you encourage the athletes to attend wrestling camps during the off-season? ___yes ___no

Where do you gain information regarding nutrition?

___ Magazines  ___ Television
___ Peers  ___ Classes (continuing education, workshops, etc.)
___ Journals  ___ Newspapers
___ Books  Other ________________

Where do you think your team will place in district this year? 1 2 3 4 5 6 7 8 9 10 (circle one)

Where did your team place last year in district? 1 2 3 4 5 6 7 8 9 10 (circle one)
Athletes Information Sheet:

Age: _____ years

Year in school: _____ Freshman
_____ Sophomore
_____ Junior
_____ Senior

How many years have you competed in wrestling? _____ years

Have you attended any wrestling camps? ___ yes ___ no

If yes, name of camp: ____________________

How many times? ______

Does your coach recommend wrestling camps for the athletes? ___ yes ___ no ___ don't know

What weight class do you usually compete in? _____ lbs.

Do you need to lose weight to compete in this weight class? ___ yes ___ no

If yes, approximately how much weight? _____ 0-2 lbs.

_____ 3-5 lbs.

_____ 6-10 lbs.

_____ 11-20 lbs.

_____ 21+ lbs.

How many days do you need to lose this weight? _____ days.

Who do you consult regarding nutrition information? _____ coach

_____ athletic trainer

_____ parent

_____ peers

_____ teacher

Have you had a nutrition course or nutrition as part of a high school course? ___ yes ___ no

Do you take vitamin or mineral supplements on a regular basis? (more than 5 times/week) ___ yes ___ no

Do you take protein or amino acid supplements? ___ yes ___ no

If yes, what kind? __________________________(name brand)

Where do you think your team will place in district this year?

1 2 3 4 5 6 7 8 9 10 (circle one)
6. Coaches and Wrestlers' consent forms.
CONSENT FORM FOR COACHES INVOLVED IN THE HIGH SCHOOL WRESTLING STUDY

A research project being done through the Department of Nutrition and Food Management at Oregon State University will be taking place at a number of high schools in the Willamette Valley. The research project will be examining the extent to which competitiveness and the nutrition knowledge of high school wrestlers and their coaches is related to the severity of weight cutting practiced. The study will take place throughout the wrestling season and will require the coaches to complete a number of questionnaires at scheduled times. All data will be treated in an anonymous way and therefore poses no risk to the participants. I understand that as a participating coach, I will be asked to complete 2 questionnaires regarding nutrition knowledge and competitiveness at the beginning of the season along with a personal information form, and also the competitiveness questionnaire within 2-3 weeks of the end of the regular wrestling season.

There are a number of potential benefits that may result from the study, both for the athletes and the coaches including:

* an increased awareness of nutritional myths
* an increased awareness of the need for sound nutritional knowledge, both for coaches and athletes
* a greater understanding of the extent to which competitiveness may influence the severity of weight cutting practiced by wrestlers

When the study is completed, all appropriate information will be shared with the participating high schools in an anonymous format.

To maintain confidentiality, all participating students and coaches will be assigned a number, and this number will be used on all questionnaires and data records. Only the primary investigator in the study will know what name corresponds to a given number.

Participation is voluntary and refusal to participate will involve no penalty. If questions arise, please feel free to contact either Patty Fahlstrom-Nopp at 967-8871 or Dr. Jim Leklem at 737-0969.

By signing this form, I acknowledge that I have read the above letter and that I agree to participate in the high school wrestling study being done through the Department of Nutrition and Food Management at Oregon State University.

X___________________________ Date________________________
(coaches signature)
CONSENT FORM FOR ATHLETES AND PARENTS INVOLVED IN THE HIGH SCHOOL WRESTLING STUDY

A research project being done through the Department of Nutrition and Food Management at Oregon State University will be taking place at a number of high schools in the Willamette Valley. The research project will be examining the extent to which competitiveness and the nutrition knowledge of high school wrestlers and their coaches is related to the severity of weight cutting practiced. The study will take place throughout the wrestling season and will require that the athletes complete 2 questionnaires at the beginning of the season regarding nutrition knowledge and competitiveness, and then repeat the competitiveness questionnaire 2-3 weeks before the end of the regular wrestling season. Also, weight charts will be kept for the entire season and will be consulted. All data will be anonymous and therefore poses no risk to any of the participants.

There are a number of potential benefits that may result from the study, both for the athletes and the coaches including:

* an increased awareness of nutritional myths
* an increased awareness of the need for sound nutritional knowledge, both for coaches and athletes
* a greater understanding of the extent to which competitiveness may influence the severity of weight cutting practiced by wrestlers

When the study is completed, all appropriate information will be shared with the participating high schools in an anonymous format.

To maintain confidentiality, all participating students and coaches will be assigned a number, and this number will be used on all questionnaires and data records. Only the primary investigator in the study will know what name corresponds to a given number.

Participation is voluntary and refusal to participate will involve no penalty. Each high school aged participant must return this consent form signed by a parent or legal guardian in order to participate in the study.

If questions arise, please feel free to contact Patty Fahlstrom-Nopp at 967-8871 or Dr. Jim Leklem at 737-0969.

By signing this form, I understand that I am agreeing to participate in the high school wrestling study, and that I will be asked to complete 3 questionnaires throughout the season and that my weight will be recorded throughout the season.

X ___________________________ date________________
(athlete)

By signing this form, I agree to allow my son,__________________, to participate in the high school wrestling study being done through the Department of Nutrition and Food Management at Oregon State University.

X ___________________________ Date________________
(parent)
7. Letters to Athletic Directors and Coaches.
October 10, 1992

Name
High School
Address

Dear Mr. 

Let me introduce myself. My name is Patty Fahlstrom-Nopp, and I am a graduate student pursuing my MS in Nutrition at Oregon State University, with an emphasis on sports nutrition. I am also completing the requirements to become a Registered Dietitian. I am writing this letter as an introduction to my thesis project, which I will be working on this year with Dr. James Leklem from the Department of Nutrition and Food Management at OSU.

I am writing to the athletic directors of each school targeted for this study in order to secure approval for the research to take place. It is my intention to include as many of the Willamette Valley league schools as possible, and it will be necessary to have the cooperation of both the athletic director and the coach(es) of each school before anymore can be done. A meeting of the Human Subjects Committee will also take place within the month. During this meeting, the project will be studied to ensure that everything is clearly planned out and that the research is done appropriately, with no potential harm to the participants.

In my thesis project, I will be looking at a number of factors that may effect the degree of weight cutting in high school wrestlers. The primary factors that I will be focussing on are:

* the competitiveness of the wrestling coach(es)
* the competitiveness of the wrestler
* the nutrition knowledge of the coach(es)
* the nutrition knowledge of the wrestler

Questionnaires will be utilized to measure both competitiveness and nutrition knowledge and wrestler weights will need to be monitored. I will be looking for correlations between the above listed factors and the degree of weight lost at various times throughout the season. All participant information will be kept confidential.

There are a number of potential benefits that may result from this study, both for wrestling coaches, and for the athletes including:

* an increased awareness of nutritional myths
* an increased awareness of the need for sound nutritional knowledge, both for coaches and athletes
* a greater understanding of the extent to which competitiveness may influence the severity of weight cutting practiced by wrestlers.

When the study has been completed, all appropriate information will be shared with the participating schools and any remaining questions will be answered.
I thank you for your time and consideration and I will contact you by phone within the next week to further discuss the project. I have directed letters similar to this to the head wrestling coach of your school, and will be in further contact with him. Feel free to contact either Dr. Leklem or myself by phone or letter to answer any questions that you might have.

Sincerely,

Patty Fahlstrom-Nopp

cc. James Leklem
Dept. of Nutrition & Food Mgmt.
Oregon State University
Corvallis, Or. 97331
(503) 737-0969
November 05, 1992

Coach
High School
Address

Dear Coach:

My name is Patty Fahlstrom-Nopp, and I am writing in reference to the thesis project being done through the Department of Nutrition and Food Management at Oregon State University. I understand that you may have had a chance to read the letter that was sent to the athletic director of your school and that in it the study was briefly described, so forgive me if this letter is at all redundant.

I am contacting each head wrestling coach in the Willamette Valley in order to further explain the project, including the projected time commitment to the teams, and to hopefully secure cooperation. In case you have not seen the above mentioned letter, I will explain the project below.

In my thesis project, I will be looking at a number of factors that may effect the degree of weight cutting in high school wrestlers. The primary factors that I will be focussing on are:

* the competitiveness of the wrestling coach(es)
* the competitiveness of the wrestler
* the nutrition knowledge of the wrestling coach(es)
* the nutrition knowledge of the wrestler

Questionnaires will be utilized to measure both competitiveness and nutrition knowledge, and wrestler weights will need to be charted. I will be looking for correlations between the above listed factors and the degree of weight lost at various times throughout the season.

The projected time involved will be minimal as I realize how busy the season is. I am estimating that I will require approximately 45 minutes at the beginning of the season to administer the questionnaires and another 30 minutes toward the end of the season to do the same. Prepractice daily weights will need to be kept by each team, and validation of these weights will occur randomly at about one-third of the schools. The validation procedure will require only about 20 minutes, and the coach will be notified beforehand to make sure that practice will not be disrupted. It is my aim to make this process as easy as possible for the teams involved, and the project has been thought out as to minimize the time involvement of the team.

There are a number of potential benefits that may result from this study, both for the wrestling coaches and for the athletes including:

* an increased awareness of nutritional myths
* an increased awareness of the need for sound nutritional knowledge, both for coaches and athletes
* a greater understanding of the extent to which competitiveness may influence the severity of weight cutting practiced by wrestlers.
I hope to secure the cooperation of all of the targeted schools in order to make this project a success. I thank you for your time and consideration, and I have enclosed a simple informational sheet for you to fill out and return with a team schedule in the addressed, stamped envelope enclosed. This is simply to give me a general idea of how many coaches and athletes I will be working with, and some other basic information.

I will contact you by phone within the next few weeks to answer any remaining questions you might have and to schedule preliminary dates for distributing the questionnaires. Feel free to contact either Dr. Leklem, my thesis advisor, or myself by phone or letter to answer any questions.

Sincerely,

Patty A. Fahlstrom-Nopp

c. James Leklem
   Dept. of Nutrition & Food Mgmt.
   Oregon State University
   Corvallis, Or. 97331
   (503) 737-0969
8. Human Subject's Committee Application.
Application for OSU Human Subject Committee

1. A brief description of the significance of this project in lay terms.

   The practice of weight cutting is widely used by wrestlers throughout the United States in order to gain a competitive edge over the opponent. In the sport of wrestling, the athletes often must compete at a weight below their normal preseason or postseason weight. The amount of weight lost for a match can vary from .5 up to 21 lbs. (Steen et al. 1990), and with some athletes, the losses may be even more severe. There has been an increasing interest in the practice of weight cutting in the last three decades, and there exists much concern among many of the groups involved in the health and fitness area. Both the American College of Sports Medicine (ACSM) and the American Medical Association (AMA) have issued position statements that strongly discourage the severe food and fluid restrictions that many competing wrestlers continue to practice. At present, no research has looked at the relationship between competitiveness and the severity of weight cutting, nor at the relationship between the level of nutrition knowledge of the coaches and athletes and the severity of weight cutting practiced by the athletes. I feel that this is a valid area of research and that the results may further the understanding of why so many athletes persist in using rapid weight loss techniques to reach a lower weight class, and to what degree the coaches and wrestlers attitudes and levels of nutrition knowledge influence the weight cutting practices.

2. A brief description of the methods and procedures to be used during this research project.

   Two questionnaires will be utilized to measure the parameters of competitiveness and nutrition knowledge. A Sport Orientation Questionnaire developed by Diane L. Gill (1988), will be used to measure the competitiveness of both the athletes and the coaches. This questionnaire has previously been validated for the given population. A second questionnaire adapted from a thesis by Susan M. Burky (1985) will be utilized to measure the nutrition knowledge of the coaches and athletes. The modified questionnaire will be validated before use by determining clarity of questions, desired information, and overall level of difficulty. The original questionnaire has been validated for the coaching population in the past. The nutrition knowledge questionnaire and the competitiveness questionnaire will be completed approximately 2-3 weeks into the wrestling season, in late November, before competitions matches begin. The nutrition knowledge questionnaire will be completed only once, as changes in levels of knowledge are not expected to change over 3 months time. The competitiveness questionnaire will be completed once again 2 or 3 weeks before the end of the regular wrestling season, in early February, to assess whether or not the level of competitiveness has increased as it is expected to. Wrestler weights will be kept and monitored throughout the data collection period, and since many of the weights (prepractice) are recorded by the athletes, a random validation procedure will take place approximately 5 times throughout the season. This validation procedure consists of choosing a school, notifying the coach that weights will be checked, and then showing up before practice begins to recheck the weights that have been reported for that day. The severity of weight cutting will be defined as the amount of weight lost prior to a
match, and will be divided into categories dependent on the number of pounds lost. These categories have been defined in a study by Steen and Brownell (1990).

3. A description of the benefits and/or risks to the subjects involved in this research.

   There are a number of potential benefits that may result from this study, both for wrestling coaches, and for the athletes including:

   * an increased awareness of nutritional myths
   * an increased awareness of the need for sound nutritional knowledge, both for coaches and athletes
   * a greater understanding of the extent to which competitiveness may influence the severity of weight cutting in high school wrestlers.

   There are no known potential risks to the subjects involved in this research.

4. A description of the subject population, including number of subjects, subject characteristics, and method of selection.

   The subject population will include a total of 15 high school wrestling teams and their respective coaching staff. All of the schools are classified as AAAA and are located in the Willamette Valley. They include the following:

   Salem high schools: McNary, Sprague, South and North Salem
   Corvallis high schools: Corvallis and Crescent Valley
   Albany high schools: West and South Albany
   Lebanon high schools: Lebanon
   Eugene high schools: Churchill, Sheldon, Willamette, and North and South Eugene
   Springfield high schools: Springfield

   The male wrestlers will range in age from freshmen to seniors in high school and will be divided into junior varsity and varsity. Approximately 500 athletes will participate, and 45 coaches. The coaching staff will include the head wrestling coach and any assistant coaches. The reason that only male wrestlers are included in this study is due to the fact that at this time there are no female wrestling teams.

5. A copy of the informed consent documents.

   See attached pages for the parental and athlete consent form and the coaching staff consent form.

6. A description of the methods by which informed consent will be obtained.

   Informed consent will be obtained from the participating subjects during scheduled team meetings. Parental consent forms will be sent home with the athletes.
along with a letter of explanation and a stamped, addressed envelope. Names and phone numbers of athletes will be taken as the consent forms are handed out, and parents will be called if consent forms are not returned within one week.

7. A description of the method by which anonymity or confidentiality of the subjects will be maintained.

Each participant will be assigned a number that will be used throughout the study, and only the primary investigator will know what name corresponds to a given number. All data will be collected under the assigned number, and weight chart data will also be kept on file under the respective numbers.

8. A copy of any questionnaires to be used in this project.

Each participant will be given a copy of each questionnaire at the beginning of the wrestling season, a copy of the competitiveness questionnaire again at the end of the season, a consent form, and a general information sheet. See attached questionnaires, consent forms and general information sheets.

9. Information regarding any other approvals which have been or will be obtained.

Preliminary approval of the athletic directors for each school were obtained via letters and telephone.
1. Professional Organizations:

American Academy of Pediatrics  
P.O. Box 1034  
Evanston, IL. 60204

American College of Sports Medicine  
P.O. Box 1440  
Indianapolis, IN. 46206

American Dietetic Association  
216 W. Jackson Blvd.  
Suite 800  
Chicago, IL. 60606

American Medical Association  
Nutrition Information Section  
535 N. Dearborn St.  
Chicago, IL. 60610

Sports and Cardiovascular Nutritionists (SCAN), a practice group of the American Dietetic Association.  
Same address as above.

2. Journals and Newsletters on exercise and nutrition:

Exercise:  
American Journal of Sports Medicine  
European Journal of Applied Physiology  
International Journal of Sport Nutrition  
Journal of Applied Physiology  
Journal of Sports Medicine and Physical Fitness  
Medicine and Exercise in Sport Science  
Physician and Sportsmedicine  
Research Quarterly in Exercise and Sport  
Gatorade Sports Science Exchange  
Sports Medicine Digest

Nutrition:  
American Journal of Clinical Nutrition  
Journal of Nutrition Education  
Journal of the American College of Nutrition  
Journal of the American Dietetic Association  
Nutrition Action  
Nutrition Reviews
3. Local Resources:

Nutrition faculty affiliated with departments of food and nutrition, home economics, and dietetics.

Registered Dietitians who specialize in sports nutrition (Contact the state or local Dietetics Association).

4. Books and Educational Materials:


