Establishment of weight control guidelines for North Dakota high school wrestling

Dean Walter Hermes

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ESTABLISHMENT OF WEIGHT CONTROL GUIDELINES
FOR NORTH DAKOTA HIGH SCHOOL WRESTLING

By
Dean Walter Hermes
B.A., University of Montana, 1966
Presented in partial fulfillment of the requirements for the degree of Master of Science for Teachers of Health, Physical Education and Recreation
UNIVERSITY OF MONTANA
1971

Approved by:

Chairman, Board of Examiners

Dean, Graduate School

Date Aug 14, 1971
ACKNOWLEDGEMENTS

The author wishes to thank Brian J. Sharkey and John Dayries, Graduate Advisors, for their guidance and counseling during the completion of this paper.

The author also wishes to take this opportunity to express his sincere appreciation to his wife, Deanna Marie, whose patience and understanding helped make this paper a reality.

D.W.E.
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Chapter 1

THE PROBLEM AND DEFINITIONS
OF THE TERMS USED

INTRODUCTION

As wrestling has grown in popularity, "making weight" and its ramifications, has become a most controversial and criticized practice in the sport. There are a few coaches and wrestlers who try to gain an advantage to win by exploiting and abusing weight losing policies. Because of the belief that men making weight have more problems than those who are not, most coaches, (16) team doctors, (15) and authors (17) agree that wrestlers should compete as close to their normal body weight as possible. They also agree that excessive weight reduction has been one of the greatest problems in promoting and popularizing the sport.

Perhaps the most frequently cited issue relates to the possible undesirable effects of excessive weight reduction on the physiological well-being of the high school athlete. The concern is whether normal growth and development is endangered by these practices. (17)

Another issue centers around the percentage of body weight that can be lost safely, and who should decide
on the amount that is safe to lose. It is doubtful if athletes of high school age are knowledgeable enough to make this judgment. The problem is complicated for the young wrestler because frequently he will find himself in a weight class where there may be several other good wrestlers. The boy and the coach must then decide whether to bring the boy down several pounds to a weight class he can compete in or allow him to wrestle behind a better boy, denying him an opportunity to compete and enjoy the benefits of varsity competition. All too often it is this latter consideration, and not an interest in the physical health of the youngster, that determines the decision. The real truth is that the controlled research that has been done in this field is poorly communicated to the coach and wrestler.

The Problem

The purpose of this investigation was to (1) investigate the literature to find the possible detrimental effects that excessive weight loss may have on the physical health of the high school wrestler; (2) to evaluate if one method of losing weight was more harmful than another, using as guidelines the research of professionals representing the areas of health, physical education and medicine; (3) to survey North Dakota Class "A" wrestling coaches on their present positions regarding weight reduction
and its control, with the aim of making recommendations for the development of guidelines for the establishment of a weight control plan to be used by high school wrestling coaches in North Dakota; (4) to recommend a weight reduction plan that will fit the sport to the wrestler, not the wrestler to the sport.

**Significance of the Problem**

The great number of articles, periodicals and books devoted to overweight and weight reduction attest to the importance of this subject to the public. If wrestling is to continue as an interscholastic sport in our curriculum, the "wrestling coach" must be able to establish the weight at which the athlete performs best, while providing for the optimal health of his wrestlers.

It is hoped the results of this study will show (1) the possible detrimental effects the coach and wrestler may be facing in an excessive or uncontrolled weight reduction program; (2) which program of weight reduction is recommended and safe for weight loss; (3) guidelines for establishing a controlled and safe weight reduction plan, as well as a consolidation of the research that has been done in this area.

**Limitations of the Study**

1. The research that has been cited has not always been conducted on athletes or adolescents of
2. The survey for establishment of wrestling weight control guidelines was limited to North Dakota Class "A" coaches.

Definitions

The following terms are defined as they were used in this study.

1. North Dakota Class "A" Wrestling Coaches - Coaches representing all schools who have an enrollment of over three hundred students.

2. Body Fluid - Not excess weight, but fluid necessary to maintain the electrolyte balance.

3. Body Fat - refers to fat that is in depots and is stored in reserve, but accumulated from excess caloric intake above the expenditures of energy.

4. Subcutaneous Fat - Fat lying under the subcutaneous layer of skin, not muscular or skeletal fat.
Chapter 2

SURVEY OF RELATED LITERATURE

A review of the literature revealed numerous and varied studies concerned with weight loss and its effects. For the sake of continuity, this review will be presented in four sections. The first section will deal with sources of weight loss. The second section will review the effects of food restriction. The third section will deal with the effects of dehydration and the final section will discuss some effects, other than physiological, that are related to weight reduction.

Cooper (15) says that there are two main sources of weight which can be reduced in the body, body fat and body fluid.

**Body Fat--A Source of Weight Loss**

Body fat is in depots and is stored in reserve. It accumulates due to an excess caloric intake over our energy expenditures. Body fat is oxidized in the body into two main components, glycerol and fatty acid. (1) Glycerol is oxidized into carbohydrates and finally glucose. Glucose is oxidized with the release of heat and energy. Fatty acids, on the other hand, are oxidized with the production of ketone bodies. These ketone bodies are utilized slowly by
the body and at a constant rate. When fat is oxidized at a rapid rate, as in a "crash diet," ketone bodies are formed faster than they can be utilized and accumulate, forming a condition called acidosis. This is a state where ketone bodies have replaced essential electrolytes. This distorts the fluid and electrolyte balance and interferes with cellular function. However, it is generally assumed by coaches that because carbohydrates are utilized first in the energy breakdown, body fat is oxidized too slowly to be of value in an athletic contest.

Sharkey (33) reports that the type of exercise that leads to physiological fitness allows an increase in the caloric expenditures. He also says that exercise improves the metabolism of fat. Diet alone results in a weight loss that is 62 percent fat, but diet and exercise result in a weight loss that is over 78 percent fat. Therefore, depending on the fitness level of the individual, body fat may actually become a significant source of energy. For these reasons, Cooper (15) and Henson (19) recommend the optimum weight should be reached before competition begins and at a slow rate of two to five pounds per week. They further recommend that the weight be held within a few pounds of that optimum for the remainder of the season.
Body Fluid--A Source of Weight Loss

Astrand (1) relates that body fluids make up 70 percent of our total weight. We take this fluid in through the gastrointestinal tract with our food, and lose fluid through the lungs, sweat glands and kidneys. About 50 percent of the body weight is fluid within the cells and is called intracellular fluid. Intestinal or interstitial fluid represents 15 percent of the body weight and blood plasma 5 percent. While these body fluids are 70 percent of the total body weight, according to Henson (19), they are not considered excess weight. The loss of these body fluids results in dehydration and water loss is always accompanied by a loss of electrolytes. Electrolytes are the ions in solution in body fluid which are necessary for all physical functions, such as muscle contractions and transmission of nerve impulses. Initially, the water loss is sustained by the interstitial fluid. During this initial loss of body fluid, nature is trying to preserve the blood volume and intracellular volume. With advancing dehydration, kidney function is impaired, there is a loss of blood volume, and finally, loss of intracellular fluid.

Effects of Diet on Performance

Authorities (17,23) generally have condemned weight reduction methods used by wrestlers. The American Medical Association Committee on Sports composed the following statement:
In sports in which participants are matched by various classes, it has been common practice for athletes to go on rigorous diets (sometimes approaching the starvation level) for varying periods of time prior to weighing periods. Concurrently, athletes sometimes dry out by not taking water in an effort to cut their weight still further. Under the strong motivation and appeal of sports, these practices may be carried to great extremes.

From a health standpoint "crash diets" designed to produce rapid or extreme weight loss are to be condemned. Also, disturbing the fluid balance of the body, by drying out, holds serious health hazards. These dangers are intensified in the immature organism of the growing adolescent athlete. They are also intensified by periodic weighings which encourage the athlete to resort to such practices at frequent intervals during the season. (8)

Those opposed to weight-reduction controls argue that it is not deleterious to the athlete's health, that it is part of the sport, that it teaches the wrestler self-sacrifice, and that the coach is best qualified to determine in which weight class his wrestler is best suited. They also point out that the research that has been done in this field is at times in conflict with authoritative opinion. Descher (16) queried thirty-two coaches in a national survey on the effect of rapid weight loss. Fifteen said that rapid weight loss affects performance adversely and fifteen said it did not. Two coaches held no definite opinion.

Keys, in a study on food deprivation, says:

Most human beings can tolerate a fat weight loss of 5 to 10 percent with relatively little function disorganization. However, human beings do not survive weight losses greater than 35 to 40 percent.
It deserves emphasis that before body weight can become a physiologically meaningful variable we have to know, at least approximately, the value of its components: active tissue, fat, bone and extracellular fluid. (3)

This study, of course, does not consider physical performance in wrestling, but was an early basis for many coaches to contend that wrestlers could lose up to 10 percent of their body weight with no detrimental effects. Taylor (36) did a follow-up on Keys' (24) study, but in his study he tried to control the amount of physical work that accompanied caloric restrictions. He found when sufficient calories and NaCl were present with an adequate vitamin supply to prevent ketosis, performance and strength could be well maintained, even at hard physical work up to a 10 percent loss of body weight. He did feel that when losing 10 percent of your body weight, emotional and motivational factors in the environment may have a profound effect on actual performance.

Within the last thirty years, Tuttle (37), Byram (42), Edwards (43), Englund (44), James (45), Kaluke (47), Nichols (49), Schuster (50), Singer (34), Wilce (52), and others have studied the effects of weight reduction on selected physiologic responses in wrestlers. The weight reduction in these studies was accomplished mainly through caloric restriction. There seems to be little difference between the methods of reduction used by the wrestlers. These studies generally reveal that a loss of from 4 to 7
10 percent of body weight results in no loss of strength or
performance and is safe for trained athletes. (14)

Recently, in a contradictory study on the effect of
fat weight loss, Salzano (32) used sixteen subjects and had
them lose two pounds of body fat per week for five weeks
and then maintain that loss for four weeks. When testing
blood pressure, reaction time and grip strength, he found sig­
nificant decreases in blood pressure and reaction time, but
no change in grip strength or endurance.

Effects of Dehydration on Performance

In a study on restriction of food and water on work
capacity, Young (40) found that from the standpoint of work
output, water restriction is of much greater significance
than food restriction. He took six highly trained dogs and
ran them to exhaustion. The first time, without receiving
any supplements, the dogs were able to expend 1191 calories
before reaching exhaustion. When they received a carbohy­
drate supplement and were put through the same test, they
expended 1299 calories. In the third part of the experiment,
the dogs were allowed to drink water during the run from
troughs that were attached to the side of the treadmill.
Each dog consumed 1.5 liters of water and expended 2141
calories before becoming exhausted. This is an 80 percent
increase in working ability and endurance capacity. It also
demonstrates the physiological importance of water. (9)
Blyth (10) observed a significant reduction in performance when subjects lost 3 percent of their body fluid through dehydration. In a similar study, Bosco and Greenleaf (12) selected nine male students between the ages of twenty and twenty-nine, who had athletic experience, and had them lose weight by dehydration for two one week periods, while maintaining them on a nutritionally adequate diet. Their results showed a mean weight loss of 2.2 percent per week and a paralleling decrease in elbow flexion strength of 10.7 percent. It also showed a general decrease in all isometric strength measures, except knee extension. When studying Finnish wrestlers, Ahlman (7) found that by inducing a four pound water loss through sweating, the cardiovascular system was affected. This effect did not pass within three hours after competition, even if food and water were allowed.

In a contradictory study, Bock (11) attempted to determine the effects of a forty hour water restriction, sauna bath sweating period on maximal oxygen intake, heart rate and central core temperatures. He found no significant changes in any of these measures of cardiorespiratory endurance. Saltin (31) also agrees that a 3 to 4 percent weight loss through dehydration does not affect strength measurement.
Other Effects Related to Weight-reduction

Recent studies show that the effect of water restriction on the cardio-respiratory system is not clear. Walker (39) found that other physiological problems are also involved. For instance, when non-obese subjects were reduced nine to ten pounds, serum lipid levels were reduced. When the weight was put back on, the serum lipids rebounded and even increased. It is felt that serum lipid levels are associated with atherosclerosis and coronary thrombosis problems. He recommends that caloric balance be maintained to control serum lipid levels.

Bourne (13) wonders whether an athlete in training and on a restricted diet can fulfill his increased vitamin and mineral needs. He also questions what type of diet can fulfill these needs. The research in this area is scarce and contradictory. In a study on the effects of three diets on muscle glycogen, Hultman and Bergstrom (20) subjected volunteers to starvation (absence of all calories), low-carbohydrate, and high-carbohydrate diets. They found starvation and low-carbohydrate diets had the same effect on the glycogen content of the muscle, i.e. a marked decrease from the original value and an extremely slow resynthesis of glycogen after muscle work. The initial value of glycogen was not regained even after one week's full caloric diet. The high-carbohydrate diet raised the muscle glycogen level above normal value and produced rapid resynthesis after
muscular work. Glycogen is the power source in the muscle.

Nelson (47), Mayer (26), Tomaras (52), Yuhasz (54), and others, in studies on how weight cutting affects growth and development, generally find that weight cutting groups fail to grow while restricting their caloric intake, but in most cases, recover when weight reduction is terminated.

Another area that has been of some question is whether food deprivation and dehydration affect academic performance. In a study of 747 wrestlers in Iowa, Tipton and Tso-Kia (50) found an adverse effect on academic performance on the days just before a match when total water and food restriction was practiced. How large a role pre-game anticipation and excitement had on their academic performance, was not determined.

**Summary**

There are two main sources of weight that can be removed from the body: body fat and body fluid. The problem of how much weight and the type of weight that can be removed safely is confounded by a lack of definitive research. There appears to be no foolproof test for estimating weight reduction limits. Sharkey suggests the fat caliper would be the simplest method of calculating lean body mass and establishing the lower limit for percentage of fat reduction. There is much evidence to suggest that an individual in good training may take off up
to approximately 10 percent of his body weight for short periods without adversely affecting his strength, endurance, blood pressure or performance. As an example, it is reported that the body fat levels on marathon runners are from 5 to 7 percent, while the body fat levels on normally active adults are 9 percent and above. Reducing, by caloric restriction over a long period of time, however, results in the risk of vitamin deficiency.

Dehydration diets are more dangerous than semi-starvation diets. There is some evidence that any amount of dehydration can be detrimental to the cardio-respiratory system. As little as a 3 to 4 percent body weight loss by dehydration can result in fatigue. Other evidence indicates that there are no miracle diets for wrestlers but that there may be advantages in high-carbohydrate diets. Furthermore, research indicates that most authorities condemn "crash" or rapid dieting practices by wrestlers because excessive rapid dieting may result in retardation in growth.
Chapter 3

PROCEDURES USED IN THE STUDY

One purpose of this study was to attempt to develop a wrestling weight control plan for the North Dakota High School Activities Association. Therefore, a survey was prepared to establish the desires and attitudes of Class "A" wrestling coaches in North Dakota. The method and materials used are presented in this chapter.

The Scope of the Questions

The scope of the questions was limited when it was decided to confine the questions to problems of the North Dakota Class "A" Wrestling Coaches Association only. It was felt the best qualified to respond to such questions were those who were directly involved in the issues: namely, coaches and wrestlers.

The preliminary selection of issues was sought in wrestling coaches meetings at tournaments, Coaches Association meetings, and conversations at dual meets. Comments by parents and wrestlers were also noted and retained. A general review of literature revealed a similar questionnaire was developed by Lynch (34) and used in the Southern California Athletic Association. The questions were then worded
into statements that were felt to be pro and con arguments regarding weight control.

**Formation of Questionnaire**

With the statements selected, a written questionnaire survey was decided upon. Parten (4) suggested that a written survey was more practical for canvassing people where personal contact was not possible. The five point rating scale was also suggested as the most successful in attitude or opinion measurement (4). The five point scale allows the respondent to progress from strongly positive to strongly negative and insures an answer, where a yes or no questionnaire may not have allowed a response for the undecided person. This was particularly useful in Part II and Part III of Form A where the objective was to measure strength of opinion regarding North Dakota’s present plan. Lynch (34) used a separate questionnaire to survey parents and wrestlers. This survey was adopted and used by the author as Form 3 in the appendix to ascertain the feeling of wrestlers involved in weight control in North Dakota.

**Using the Written Questionnaire**

With the completion of the coaches questionnaire, it was important that the study be conducted with the cooperation and understanding of the interested Class “A” coaches of the North Dakota High School Association.
Therefore, at the North Dakota State Wrestling Tournament in February, the weight control discussion was placed on the agenda and debated during the business meeting. At the conclusion of the debate, the survey was presented and completed by the twenty-seven Class "A" coaches, who represent all the Class "A" schools which include wrestling in their sports program.

Form 3, the wrestlers questionnaire, was presented to a group of twenty varsity wrestlers who wrestled in seven or more varsity matches from November, 1970 to February, 1971. These wrestlers lost and maintained an average weight loss of 7 percent of their body weight during that period. Realizing that this survey is highly opinionated, their data is included only as a matter of interest and no formal conclusions are drawn from them.
Chapter 4

RESULTS

This chapter contains the analysis of the data collected from a survey of coaches and twenty varsity wrestlers from Williston, North Dakota. To facilitate the analysis, the data was organized into thirteen tables and will be discussed under these table headings.

There are twenty-one schools that have interscholastic wrestling in North Dakota. Out of twenty-one schools surveyed, twenty-seven questionnaires were returned. This represents a 100 percent return by member schools. The six additional questionnaires were returned by assistant coaches. Parten (4) suggests that on written surveys a 75 percent return is high and significant for interpolation.

Table 1 presents the present North Dakota weight control plan and three other plans for consideration and comparison. In formulating this part of the questionnaire, it was felt by several of the respondents interviewed that the present North Dakota plan was inadequate because it was inflexible and detrimental to the wrestler. Therefore, it was felt that plans representing entirely different extremes should be presented. Comments were also asked for in the
hope that some respondents would have a better plan for weight control. All three of these plans were recommended by Richard Schafer of the National High School Association (28), as approved and successful weight control plans.

Plan A

The Montana Plan follows all of the recommendations of the Official Wrestling Guide (24) and was presented in the questionnaire as a conservative weight control plan. It states that a doctor's physical and state weight certificate on how much weight a boy can lose must be filed with the State Association by a certain date, as specified by the Association. It allows a boy to out weight or gain weight from one weight class to another with no restriction or penalty.

Plan B

The Nebraska Plan is employed in Nebraska and several other states and is considered to be a radical plan by many coaches. It is opposed to most existing plans. This plan eliminates weighing in at all after the first weigh-in and is based on a handicap system of forcing the wrestler to add pounds, not cut them. This plan sets a minimal weight under which a wrestler cannot wrestle. This is done by conducting a surprise weigh-in at the beginning of the season, supervised by the Activities Association. The boy then receives a weight handicap that starts with five pounds
at the 98 pound class and goes up one pound for every twenty pounds a boy weighs over 98. Therefore, a boy weighing in at 98 would add five pounds and now weigh 103. Thus, he would be too heavy to wrestle at 98 pounds so he would be forced into the 105 pound class. As mentioned above, the "advantage" of this plan is that after this initial weigh-in the boy does not weigh in again until the final tournament of the year. This plan eliminates weigh-ins and allows a coach to "coach" and not worry about the effects weight reduction might have on his wrestlers.

**Plan C**

The Oregon State Athletic Association Plan is similar to Plan 3 in that it adds a five pound handicap at 98 and a one pound additional handicap for every twenty pounds a wrestler weighs over 98. The difference between Plan 3 and Plan C is that Plan C allows a challenge weigh-in anytime an opposing coach feels a boy is not within three pounds of his handicap weight. Under this plan, if a boy exceeds his handicap weight allowance by more than three pounds, he automatically forfeits the match.

**Plan D**

The present North Dakota Plan states each wrestler weight class must be set and certified by a physician. After this certification, a boy must make his assigned weight prior to every match and cannot change weight classes.
for the remainder of the season unless he is recertified for a heavier weight class than the initial physician's certification. Under this plan, a one pound allowance for growth is added in January and an additional two pounds in February.

Discussion of Results

Some selected problems of weight-reduction were studied by means of questionnaires. After the data were tabulated, tables were prepared to analyze and place the results in a meaningful order. The remainder of this chapter presents these tables for analysis. Tables 1 through 11 deal with the coaches questionnaire. The respondents are asked to make judgments ranging from strongly agree to strongly disagree on controversial statements regarding weight reduction and control. It was felt that by presenting these statements for selection, results could be obtained to determine the amount of research information coaches are using in developing their programs concerning weight-reduction. Comments were also asked for in the hope that a better plan could be developed than the ones presented.

The results of Table 1 clearly indicate that coaches feel the North Dakota Plan is inadequate. It also appears that most of them favor a conservative weight control program in line with national policies.

The coaches also appear opposed to any of the more radical plans or their modifications.
Table 1

Coaches Responding to the Weight Control Plan They Felt Would Best Serve the Wrestler and the Sport and the Plan They Felt Would Least Serve the Wrestler and the Sport

<table>
<thead>
<tr>
<th>Plan</th>
<th>Coaches</th>
<th>Percent of Best Choice</th>
<th>Percent of Least Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan (A) The Montana Plan</td>
<td>No. = 27</td>
<td>74</td>
<td>4</td>
</tr>
<tr>
<td>Plan (B) The Nebraska Plan</td>
<td>No. = 27</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Plan (C) The Oregon Plan</td>
<td>No. = 27</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td>Plan (D) The Present North Dakota Plan</td>
<td>No. = 27</td>
<td>0</td>
<td>18</td>
</tr>
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</table>

Tables 2 through 11 indicate the strength of the coaches’ opinions on the effects of weight reduction.

This page of the questionnaire was also given to the parents of forty Williston High School wrestlers. Ninety percent preferred plan "C" and 10 percent preferred plan "B".
Table 2

One of the major reasons why parents do not lend strong support to the sport of wrestling is because of the dieting practices and skipping meals.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
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<td></td>
<td>N = 27</td>
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<tr>
<td>Strongly Agree</td>
<td>7</td>
</tr>
<tr>
<td>Agree</td>
<td>56</td>
</tr>
<tr>
<td>Undecided</td>
<td>4</td>
</tr>
<tr>
<td>Disagree</td>
<td>33</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

Sixty-three percent of the coaches felt dieting practices were one of the major reasons parents did not lend strong support to wrestling programs.
Table 3

Statement 2: The practice of dieting to maintain weight or reduce weight is a part of the sport and should be allowed.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>19</td>
</tr>
<tr>
<td>Agree</td>
<td>62</td>
</tr>
<tr>
<td>Undecided</td>
<td>19</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

These results are very strongly in favor of allowing weight reduction. Eighty-one percent favor its continuation, while no one feels it should be discontinued.
Table 4

Statement 3: Voluntary dehydration or "dry out" (loss of weight by doing without water and other liquids) for short periods of time to make weight disturbs the fluid balance of the body and is a serious health hazard.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>4</td>
</tr>
<tr>
<td>Agree</td>
<td>15</td>
</tr>
<tr>
<td>Undecided</td>
<td>11</td>
</tr>
<tr>
<td>Disagree</td>
<td>66</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>4</td>
</tr>
</tbody>
</table>

Seventy percent of the coaches felt dehydration for short periods of time was not a serious health hazard. Nineteen percent thought it was a health hazard and 11 percent were undecided.
### Table 5

Statement 2: A wrestler and his coach should decide for which weight class the wrestler is best suited.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>4</td>
</tr>
<tr>
<td>Agree</td>
<td>38</td>
</tr>
<tr>
<td>Undecided</td>
<td>10</td>
</tr>
<tr>
<td>Disagree</td>
<td>44</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>4</td>
</tr>
</tbody>
</table>

N = 27

On this question the opinion is about evenly split. Forty-two percent felt a wrestler and his coach should decide for which weight class a wrestler is suited. Forty-eight percent felt someone, other than the coach and the wrestler, should make this decision.
Table 6

Statement 5: "Staleness" (a decline or plateau in performance) on the part of the wrestler often results from prolonged practice of weight-reduction.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>19</td>
</tr>
<tr>
<td>Agree</td>
<td>62</td>
</tr>
<tr>
<td>Undecided</td>
<td>19</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

N = 27

Coaches felt very strongly that staleness (plateau or decline) in performance was caused by prolonged weight reduction. No one disagreed with this statement.
Table 7

Statement 6: Controlling weight reduction handicaps the "small" school in meeting the "big" school in competition.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>19</td>
</tr>
<tr>
<td>Agree</td>
<td>19</td>
</tr>
<tr>
<td>Undecided</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>58</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>4</td>
</tr>
</tbody>
</table>

Coaches felt weight control programs did not handicap any certain size school.
Table 8

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>19</td>
</tr>
<tr>
<td>Agree</td>
<td>44</td>
</tr>
<tr>
<td>Undecided</td>
<td>18</td>
</tr>
<tr>
<td>Disagree</td>
<td>19</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

Most coaches (63 percent) affirmed their belief that weight reduction is a factor in winning, because it allows a wrestler who reduces an edge in strength over his opponent who has not reduced. Nineteen percent disagreed.
Table 9
Statement 8: The practice of weight-reduction teaches the wrestler discipline, self-sacrifice and perseverance and, therefore, it is justified.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>38</td>
</tr>
<tr>
<td>Agree</td>
<td>22</td>
</tr>
<tr>
<td>Undecided</td>
<td>11</td>
</tr>
<tr>
<td>Disagree</td>
<td>29</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

While most coaches agreed with this statement, it was significant that twenty-nine percent disagreed.
Table 10

Statement 9: The practice of weight-reduction reduces the wrestler's classroom efficiency and tends to make him nervous and irritable.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
</tr>
<tr>
<td>Agree</td>
<td>22</td>
</tr>
<tr>
<td>Undecided</td>
<td>22</td>
</tr>
<tr>
<td>Disagree</td>
<td>45</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>11</td>
</tr>
</tbody>
</table>

While the largest body here disagreed with the statement, it is interesting to note that a fairly large group were undecided.
Table 11

Statement 10: A weight-reduction of no more than 5 percent of the total body weight would be a safe, sane, and equitable practice to follow.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 27</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>26</td>
</tr>
<tr>
<td>Agree</td>
<td>33</td>
</tr>
<tr>
<td>Undecided</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>26</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>15</td>
</tr>
</tbody>
</table>

Opinion here again is fairly even but 59 percent do agree that a 5 percent weight reduction plan is safe, sane, and equitable. Forty-one percent disagree.

Tables 12 and 13 show the opinions of wrestlers who have experienced weight reduction for wrestling.
This question was used to check about how much weight each of the varsity wrestlers lost and an insight into which method was preferred.
Table 13

Information Based on Personal Opinion

<table>
<thead>
<tr>
<th>Question 1: Did the loss of weight hinder your performance as a wrestler?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Most wrestlers felt weight loss did not hinder their performance. However, 25 percent reported it did hurt their performance.

<table>
<thead>
<tr>
<th>Question 2: Did your parents object to your losing weight to wrestle?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Fifty percent of the parents did object to their son's losing weight while only 10 percent did not object. Forty percent were undecided.
Table 13 (Continued)

<table>
<thead>
<tr>
<th>Question 3: Do you think the practice of weight reduction should be stopped?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Sixty percent did not think weight reduction should be stopped, while 20 percent felt it should. Twenty percent were undecided.

<table>
<thead>
<tr>
<th>Question 4: During your practice of weight reduction, did you experience any symptoms, listed below, that you felt were caused by your dieting practices?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
</tr>
<tr>
<td>Staleness</td>
</tr>
<tr>
<td>Restlessness</td>
</tr>
<tr>
<td>Weakness</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

The most common symptom experienced by the wrestlers, and felt to be a result of their dieting practices, was the feeling of restlessness.
Chapter 5

SUMMARY AND RECOMMENDATIONS

Summary

The purpose of this study was to report on the possible detrimental effects of excessive weight reduction on the high school wrestler's physical health, to evaluate the present wrestling weight control plan in North Dakota, and to suggest recommendations from various professionals who have done research on the effects of weight reduction. This was done with the aim of developing guidelines for the establishment of a weight control plan to be used by the High School Wrestling Coaches Association in North Dakota.

A review of the literature concluded that:

1. Rapid loss of depot fat may cause acidosis and electrolyte imbalance.

2. Caloric restriction may lead to a vitamin and mineral deficiency and cause a failure to grow properly. It would be foolhardy to ignore the warnings of Peckos (29) and Nelson (46) that the adolescent cannot afford a drastic reduction in calories and still maintain proper growth and development.
3. Dehydration, at any level, may adversely affect the cardio-respiratory system, and at the 3 or 4 percent level can result in electrolyte imbalance.

4. The American Medical Association (8) and experts in the field (19,49) recommend no weight loss above four pounds should be undertaken without medical advice.

Questionnaires were sent to all Class "A" wrestling coaches in North Dakota to solicit their opinions on weight reduction programs, methods of change, amounts of weight loss that are safe, reasons for lack of support in wrestling, and some of the physiological effects of weight reduction. In addition, an opinion survey was given to a group of Williston High School wrestlers to survey their opinions on weight reduction.

One hundred percent or 27 of the 27 Class "A" wrestling coaches in North Dakota returned questionnaires sent to them. The coaches were clearly interested in developing a safe and sensible weight control plan to allow wrestlers to be competitive, and at the same time protect the health and welfare of all boys in wrestling. Results of the questionnaire show coaches are not satisfied with the present North Dakota weight reduction plan. It also shows that 74 percent of the coaches thought a boy should not be bound to a certain weight class for the entire year, but should be allowed to wrestle above his certified weight class and return at any time to his certified weight.
class without penalty.

There was strong feeling that dieting practices are a major reason for the lack of parental support of the sport. Eighty-one percent of the coaches felt, however, that the practice of dieting was a part of the sport and should be allowed. They also felt self-sacrifice and perseverance was taught by weight reduction.

A strong majority of coaches (70 percent) indicated they felt voluntary dehydration for short periods was not a serious health hazard.

On the question of who should decide which weight class the wrestler is suited for, opinion was split; 42 percent agreeing that the coach and wrestler should decide and 48 percent disagreeing. The majority, 81 percent, again felt staleness (a decline or plateau in performance) was the result of prolonged weight reduction.

Coaches generally were in agreement that a weight control program would not handicap a "small" school when competing with "big" schools and 63 percent of respondents agreed with the idea that weight reduction permits a wrestler to win when he otherwise might not have.

The idea that weight reduction reduced the wrestler's scholastic efficiency and made him nervous and irritable also was not accepted by the majority of coaches. Most of them agreed a weight reduction plan, allowing no more than
a 5 percent loss of body weight, would be safe, sane and equitable.

From the survey taken on Williston High School wrestlers, the most preferred method of dieting was low calorie diets, followed by dehydration, sweat process and fasting. On whether weight loss hindered the wrestler's performance, 55 percent replied it did not. When asked if weight reduction should be stopped, 60 percent said no. When asked if dieting affected them physically, 80 percent admitted they were in some way affected, while 20 percent felt they were not. When the wrestlers were asked if their parents objected to their dieting for wrestling, 50 percent replied yes, 40 percent were undecided and 10 percent felt their parents did not object.

The information gathered from the questionnaire indicates that the North Dakota wrestling coaches are not as informed in all areas of research regarding the effects of weight reduction as they should be. Their opinions are often in contradiction with current research. The fact that the coaches are dissatisfied with their present weight control program and are seeking to develop a better method, indicates their desire to help and protect the wrestler and the sport of wrestling.

Recommendations to the North Dakota Wrestling Coaches Association

Based on the review of research literature and the
findings of this study, the following recommendations to the Coaches Association are proposed in establishing a weight control program.

1. Mandatory medical examinations should be required before allowing any boy to cut weight (49).

2. The optimum weight should be decided upon by the doctor, coach and wrestler and this decision should be reached before the season starts (15,19).

3. The caloric intake should have enough nutritional value to insure an adequate vitamin, mineral and amino acid supply (1,29).

4. The weight of the wrestler should be held constant once the season starts and the wrestler should not be allowed to "bounce" from one weight class to another. The boy who is allowed to weigh five to ten pounds over his actual weight class is being abused and forced by the coach and himself to turn to "crash dieting" as a method of weight reduction.

5. The fluid balance should not be disturbed and any dehydration loss of more than 3 to 4 percent should be prohibited with adolescent wrestlers (7,10).

6. A tonic of information at all the North Dakota High School Association rules clinics, which are given to coaches in November, should include the detrimental effects of weight reduction on wrestlers. These effects are that "crash dieting" results in the formation of ketone bodies.
which cause acidosis. They should also know that dehydration results in fatigue and if carried past a 3 to 4 percent weight loss it is accompanied by a loss of electrolytes.

**Recommendations for Further Study**

Based on the results of this investigation, three recommendations for further study are proposed. A study is needed on the use of fat calipers in measuring subcutaneous fat levels to determine lean body weight and how much weight could be lost safely. Secondly, there is a need to develop some type of weight control plan to fit the sport to the wrestler and not the wrestler to the sport. Finally, further research should be conducted to determine the effects of weight reduction on wrestlers.
BIBLIOGRAPHY
BIBLIOGRAPHY

Books


Periodicals


**Unpublished Material**


APPENDIX A

Wrestling Weight-Control Questionnaire
for Coaches and Administrators

Please fill out the following questionnaire concerning your opinion on weight control in North Dakota. Responses will help evaluate the program as well as assist in developing guidelines for future weight control programs.

I. General Information

1. Check (X) your position.
   A. Coach
   B. Administrator

II. Weight Control Plans

1. Below are three weight control plans that were recommended as improved and successful plans in operation by Mr. Dick Schafer, of the National Federation of High School Associations.

(A) The Montana High School Association Plan

   The Montana Plan states that competition shall be divided into twelve weight classes with the Athletic Association providing the modification to the National rule, if any.

   Additional weight will be added to wrestler's classification, beginning with one pound on January 1 and two pounds on February 1. No restrictions are placed on what weight class a wrestler may enter from one meet to the next, provided he makes weight one hour, or no later than thirty minutes, before the next meet.

   A doctor's physical and weight certificate stating how much weight a boy can lose is to be filed with the State Association office by a certain date as specified by the Association. It, like the National Plan, allows a boy to cut weight or gain weight from one weight class to the next with no restriction or penalty.

(B) The Nebraska School Activities Association Plan

   This plan sets a minimal weight under which a wrestler cannot wrestle. This is done by
conducting a surprise weigh-in at the beginning of the season, supervised by the Activities Association. After this weigh-in, a weight handicap, starting with five pounds at the 98 pound class and going up one pound for every twenty pounds over 98, is added to the wrestler's weight. Therefore, a boy weighing in at 98 would add five pounds and now weigh 103; thus, he would be forced to wrestle in the 105 pound class. The advantage of this plan is that after this initial weigh-in the boy does not have to weigh in again until the final tournament of the year. This plan then, in actuality, eliminates weigh-ins.

(C) The Oregon State Athletic Association Plan

This plan is a modification of several other plans. A surprise weigh-in is held prior to December 1 and this will establish the lowest class a boy could compete in for the remainder of the season. From this date on, there will be no more weigh-ins unless a coach challenges a boy's weight. In this case, there is an over-weight allowance of three pounds and a wrestler must be able to come within three pounds of his registered weight or forfeit the match. The advantage of this plan is that a wrestler is not forced to weigh in every time he competes.

(D) Listed below is the present North Dakota High School Athletic Association Plan.

Under our present plan, beginning with the first meet after December 16, each wrestler must be examined by a physician to determine the lowest weight at which a boy should wrestle. After this weigh-in he can wrestle no lower than that weight. He must certify his weight prior to every match for the rest of the season, i.e. a 98 pound boy wrestles at 105; he must certify his weight one hour before the meet at 98 pounds. He cannot change weight classes for the remainder of the season unless he is recertified for a heavier weight class.

Under this plan a boy is allowed one pound for growth beginning January 1 and two additional pounds on February 1.
Circle the plan you feel would best serve the wrestler and the sport.

A B C D

Circle the plan you feel would least serve the wrestler and the sport.

A B C D

Coaches' Comments

_________________________________________________________________________

_________________________________________________________________________

III. Circle your response to these statements made on weight-reduction and weight control.

1. One of the major reasons why parents do not lend strong support to the sport of wrestling is because of the dieting practices and skipping meals.

   strongly agree  agree  undecided  disagree

2. The practice of dieting to maintain weight or reduce weight is a part of the sport and should be allowed.

   strongly agree  agree  undecided  disagree

3. Voluntary dehydration or "dry out" (loss of weight by doing without water and other liquids) for short periods of time to make weight disturbs the fluid balance of the body and is a serious health hazard.

   strongly agree  agree  undecided  disagree
4. A wrestler and his coach should decide which weight class the wrestler is best suited for.

strongly strongly
agree agree undecided disagree disagree

5. "Staleness" (a decline or plateau in performance) on the part of the wrestler often results from prolonged practice of weight-reduction.

strongly strongly
agree agree undecided disagree disagree

6. Controlling weight reduction handicaps the "small" school in meeting the "big" school in competition.

strongly strongly
agree agree undecided disagree disagree

7. Weight reduction permits the wrestler to win, because he is stronger when wrestling a class below his normal wrestling weight.

strongly strongly
agree agree undecided disagree disagree

8. The practice of weight-reduction teaches the wrestler discipline, self-sacrifice and perseverance and, therefore, it is justified.

strongly strongly
agree agree undecided disagree disagree

9. The practice of weight-reduction reduces the wrestler's classroom efficiency and tends to make his nervous and irritable.

strongly strongly
agree agree undecided disagree disagree

10. A weight reduction of no more than 5 percent of the total body weight would be a safe, sane and equitable practice to follow.

strongly strongly
agree agree undecided disagree disagree
If you desire a copy of the results of this study, check this space _______.

Thank you for your kind consideration and please return via the enclosed stamped envelope to:

Mr. Dean W. Hermes
Wrestling Coach
Williston High School
Williston, North Dakota 58801
APPENDIX B

Questionnaire for Wrestlers

I. General information regarding subject's weight loss

1. Weight at November 20, 1970
2. Weight at February 28, 1971
3. Amount of weight lost
4. Percent of body weight lost
5. Methods used to lose weight (check below)
   5.1 Low calorie diet
   5.2 Dehydration
   5.3 Sweat Process
   5.4 Fasting
   5.5 Other

II. Opinionated Information (circle your responses)

1. Did the loss of weight hinder your performance as a wrestler?
   Yes  No
   Explain

2. Did your parents object to you losing weight to wrestle?
   Yes  No
   Explain

3. Do you think the practice of weight-reduction should be stopped?
   Yes  No
   Explain
4. During your practice of weight-reduction, did you experience any symptoms listed below that you felt were caused by your dieting practices? Check

4.1 Staleness
4.2 Restlessness
4.3 Weakness
4.4 Other
4.5 None