A STUDY OF THE CARDIOVASCULAR PHASE OF THE 1970 KANSAS STATE UNIVERSITY CROSS COUNTRY PROGRAM

by 632

ARTHUR STANLEY HARVEY

B. S., Kansas State University, 1966

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Physical Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1970

Approved by:

Major Professor

TABLE OF CONTENTS

PART PAGE

INTRODUCTION. 1

PURPOSE OF THE PROBLEM. 2

METHOD OF STUDY 2

LIMITATIONS OF STUDY. 3

DEFINITION OF TERMS 3

RESULTS AND DISCUSSION. 5

Fundamental Premises. 6

Specific Cardiovascular Training Objectives 7

Primary Emphasis During Weeks One to Ten. 12

Interval Training Emphasis. 17

SUMMARY 24

CONCLUSION. 25

FOOTNOTES 27

BIBLIOGRAPHY. 31

LIST OF TABLES

TABLE		PAGE
I.	1970 Kansas State University Cross Country Program.	13
II.	Kansas State University Overdistance Mileage by Week. . . .	18
III.	Kansas State University Interval Training Pulse Rate Average Sheet	22
IV.	Kansas State University Interval Training Pulse Sheet . . .	23

INTRODUCTION

Each year during the latter part of summer, cross country coaches begin preparing their teams for the up-coming season. The short duration of the cross country campaign in the United States places a strong emphasis on the formulation of maximal productive workouts. The nature of a collegiate four- to six-mile race requires that the successful competitor be trained to resist fatigue. Karpovich believes that the key to this training is to provide for the increasing oxygen demands of the muscle cells in order for them to carry on oxidation processes necessary in metabolism to produce the additional energy required for prolonged exertion. This resistance capability is possible only through the conditioning of the oxygen transport or cardiovascular system.[1] Steinhaus defines endurance as distance from fatigue and further explains:

> Since oxygen can come to the muscles only via the blood system, it is obvious that any adjustment that increases the amount of blood going to the exercising muscles will thereby postpone fatigue and by so doing increase endurance.[2]

Dunaway suggests the following in regard to the importance of cardiovascular training for cross country runners:

> Thus increasingly, as the distance lengthens, the ability to run fast and win depends on the ability of the heart and blood stream to deliver enough oxygen to keep up with muscular activity. The more oxygen delivered, the faster will be the steady pace of the runner - that is, the more <u>stamina</u> he has.[3]

Therefore, cross country coaches seek to identify those cardiovascular qualities that are beneficial to running. Down states that these qualities include the transportation of oxygen to the tissues, the development of a rapid blood flow coupled with greater stroke-volume, and the increase in cardiac output along with reduced pulse rate.[4]

Travers emphasizes the importance of these qualities:

> An efficient blood supply to the muscle is necessary for the greatest muscular effort; firstly to carry oxygen and glucose to the muscles and secondly to remove carbon dioxide and breakdown products of muscular effort from them. During training the ability of the heart and blood vessels to cope with increasing demands is established.[5]

The fact that the heart and blood are primarily responsible for oxygen transportation is established. The reality that the improvement of their functioning is the critical factor in the training for cross country runners is becoming increasingly evident.

PURPOSES OF THE PROBLEM

The purpose of this problem is three-fold. The first purpose is to explain and emphasize the importance of cardiovascular training for cross country runners in general. The second purpose is to relate the principles governing the cardiovascular training of the Kansas State University cross country team. The third purpose is to theoretically evaluate the 1970 Kansas State University cross country program in regard to cardiovascular conditioning.

METHOD OF STUDY

In order to explain and evaluate cardiovascular training, it was decided to conduct a thorough investigation of the works of authorities in the field. Consequently, a search and review of the literature in the Kansas State University libraries, the personal libraries of professional colleagues, and the personal books, clinic notes, and journals of the author was executed. Working with the Kansas State University varsity cross country practice sessions has been of great

benefit in preparing an explanation and evaluation of the cardiovascular phase of that specific program.

LIMITATIONS OF STUDY

Although most works written by coaches expound on philosophy and general formats of practice sessions, few cover in any depth the cardiovascular phase of their programs. More of this information would be valuable to cross country coaches seeking further help in this area.

DEFINITION OF TERMS

An understanding of the terminology of cardiovascular training is possibly of value to the investigator of this subject. For this reason the following terms are defined:

Aerobic:	This pertains to metabolism in the cell when there is an adequate amount of oxygen present.
Capillary:	The minute blood vessel that arises from an artery and is located throughout the body tissue to deliver the needed nutrients.
Cardiac Output:	The amount of blood pumped by the heart.
Cardiac Hypertrophy:	The increase in size of the heart.
Cardiovascular System:	The word cardio pertains to the heart, and vascular refers to the blood vessels. Therefore, the cardiovascular system involves the heart that pumps