By Rob Huesca
Dispatch Staff Reporter

Hidden in the recesses of the athletic complex at The Ohio State University, an army of athletes barter its flesh, sweat and blood to the top minds of high-performance sports.

Some trade their calories for as much as $150 a day in brutal physical studies. Others submit to grueling exercise experiments in exchange for data that will help to hone their competitive edge.

Together they form the body of subjects on which researchers project their hypotheses and draw their conclusions in a new generation of exercise and diet studies at OSU. The results generated in the department of exercise physiology could change the way athletes eat and train before competition.

EXERCISE STUDIES at OSU stretch back to the 1950s, but seem to have expanded to the department's limit at a dozen a year. "I couldn't do any more research than I'm doing right now," said assistant professor Mike Sherman, a project supervisor.

Outside Sherman's small cubicle, graduate students in white coats carry blood samples to an adjacent lab for analysis. A pair of young men in wet swim trunks stride past his door to be weighed hydrostatically before a study. Several students jockey reams of data across the one unoccupied desk in the office. "I think our labs are swamped right now," Sherman observed.

About 50 subjects, from teenagers to octogenarians, participate in exercise studies every year. Though most studies usually last 10 weeks to accommodate the academic calendar, pretesting and final analysis often drag the process on for more than a year.

CHRIS Peden, a graduate student, is nearing the one-year mark since proposing a study of cyclists. Before she began her four-week project, she had the daunting task of roping volunteers for what one subject described as "hell rides."

Like many of the studies done at OSU these days, the cycling project tested the effect of carbohydrates on athletic performance. So far, research in this area is conflicting.

Peden had cyclists pedal for almost two hours on four days. Each day's ride began with a drink containing varying amounts of carbohydrates.

"At first I thought I wouldn't get enough subjects," Peden said. "A lot of them quit when they found out how rigorous the protocol was." Eventually, nine volunteers finished out of 58 who initially showed interest in the project.

"It was quite a bit of pain," said Tom Knopp, a 23-year-old senior. "I've done a bunch of marathons, but I can't even compare it to that study. The pain was so bad your legs just felt like they were burning."

Participants were also subjected to a battery of demanding tests: blood samples and oxygen readings every 15 minutes, perceived exertion reports every 15 minutes, a 10-hour fast prior to the ride.

Knopp dropped out of the test on his last day when his blood continually coagulated in the catheter. Subjects in the cycling study were unusual — not only were they superb athletes, but they completed the exercise for no money. Many of the studies at OSU pay participants through grants from agencies and companies such as the U.S. Olympic Committee and Ross Laboratories.

For example, subjects can earn as much as $150 for performing lifting and climbing tasks for eight hours in a 100-degree simulated industrial environment. "These people get paid on the number of calories of work that they can produce," said David Lamb, director of the physiology lab. "This is designed to get the greatest work productivity out of them."

SUCH COMPENSATION is a strong incentive. While Peden scurried to find nine cyclists for her study, the industrial work researchers quickly found 45 they needed.

Yet researchers stress that quick cash is the least important factor in luring subjects. "A lot of these athletes...are really interested in finding out how their bodies work; what their maximal oxygen uptake is, what their body fat is," Lamb said.

Detailed data on diet and training can be more valuable than money in highly competitive sports.
OSU'S GUINEA PIGS
Fitness experiments pay off in cold cash and hot data

Russ Reinbolt participates in one study by moving crates in a simulated work environment.
Sponsoring organizations also have profited from exercise studies in the marketing and development of dietary supplements.

A lightweight four-women's rowing team were national champions defeating 58 of 60 teams; three of the four rowers had completed a monthlong exercise study the summer before.

"They developed physically and mentally to endure the training necessary to become champions," said coach Dan Smith. "What they gained physically was endurance and strength. Psychologically they built confidence in themselves."

Sponsoring organizations also have profited from exercise studies in the marketing and development of dietary supplements.

In the last five years, for example, Ross Laboratories has poured more than $350,000 into sports nutritional research with a large portion going to OSU.

"They've got a good record and they are local; the money stays within the state," said Keith Wheeler, director of research. According to Wheeler, the research findings provide proof that the company's dietary supplements enhance training. "There is a plethora of products out there but very little research to back it up."

At a time when many academic departments are cutting back, Sherman said the training studies are in good financial shape. This year the department is working with about $150,000 in grants, with each study costing $30,000 to $40,000.
TEST RUN—With Dr. Donald K. Mathews, left, working the controls and Bob Bartels, physical education instructor, assisting with the experiment, graduate student Ed Fox takes to the treadmill in the new exercise lab at Ohio State University. The cylinder looking like a hot water tank in the background is a “spirometer,” which keeps careful count of how much air the man on the treadmill is breathing.—(Dispatch Photo)

OSU LAB CHECKS EXERCISE

Answers Sought on Why You Pant After Running

BREATH STUDY—While Dr. Donald K. Mathews holds a stopwatch and keeps an eye on a graph that’s recording the depth of his respiration, Dick Bowers, graduate student in physical education, pours his breath into a complex machine called a continuous carbon dioxide analyzer. It’s part of the equipment in a new OSU laboratory designed to study the effect of exercise, or the lack thereof, on the human body.—(Dispatch Photo)
By PHFLSS NASH

Why do you get out of breath and pant when you run?

That's one of those simple-sounding but really complex problems like "why is grass green?"

SCIENTISTS DON'T know why you gasp for air after heavy exercise.

A big new laboratory at Ohio State University has been set up to find the answer to that question and to a lot of others that have to do with the effect of exercise on the human body.

Located in the men's physical education building, the lab is full of Rube Goldberg-like machines and gadgets that give the impression somebody is going to an awful lot of expense just to find out why you pant.

BUT MOST of the equipment, as well as the renovation of the maze of rooms making up the lab, is financed by a grant from the National Institute of Health, which does not throw its money around carelessly.

"This is for research in exercise physiology, and we're just getting started," explains Dr. Donald K. Mathews, coordinator of research in the physical education department.

"If we can find out why people pant, or how an athlete gets a 'second wind,' we think we'll have information on a lot of other aspects of the breathing mechanism.

"WE ANTICIPATE our studies will bring to light all sorts of information bearing on various disease conditions of the lung.

"We want to find out the part physical fitness plays as a preventive measure in certain diseases—coronary heart attacks, for instance."

Evidence seems to show the person who leads a sedentary life is more subject to coronaries than the active person, observes Dr. Mathews.

"We want to know, for example, what effect exercise has on the cholesterol content of the blood.

"WOULD CERTAIN types of regulated exercise reduce the blood cholesterol? And if exercise can be a preventative, can it also be beneficial to the heart attack victim in the convalescent stage?"

"We want to study the relationship of physical fitness to any number of ailments—emotional disturbances, for one. Low back pain, for another. Low back pain is a popular complaint today but not to be taken lightly."

The lab is using volunteer "subjects"—most of the graduate students in phys ed.

THEY GET NO PAY, they are required to be on hand for two-hour experimental sessions, and they know they will end up with a sore arm and minus some of their own lifeblood.

While the subject is doing whatever is required—running on a treadmill, riding a bike, or what have you—his breathing is rigidly controlled and his exhaled breath is minutely examined to find out what his lung's different compartments and byways are doing with the air.

At the same time, continuous arterial blood samples (ever ride a bike with a needle stuck in your arm?) are taken to check the concentration of carbon dioxide in the blood against that in the lung. A physician oversees this procedure.

ONE MAMMOTH PIECE of equipment is a treadmill, built-to-order and bought with money furnished by the OSU Athletic Department.

Its grade and speed can be regulated. It can run in a level position or up to a grade of 16 per cent, and the subject can be made to walk or run at one-and-a-half to nine miles per hour.

"The idea," says Dr. Mathews, "is to keep the individual working but keep him in one place so we can hook all kinds of gadgets on him."

"WE CAN TELL exactly how many foot-pounds of work he's doing and how many calories he's burning up. We can regulate the exercise dosage and study the effect of frequency and intensity of exercise on the body."

"We seem to be so much more subject to certain diseases now than people were in the past. This may be because Western civilization, including the rural population, has become so highly motorized and button-ized."

"This is a fascinating area of study, a jewel of a project. So little has been done before."

"..."
Women’s work found suitable for lab study

By Jan Rebman
27 Sept 74

For the first time ever, the Exercise Physiology Research Laboratory will use female subjects in a fitness training program beginning this quarter, Edward L. Fox, associate director of the lab, said.

The lab, started by Donald K. Mathews about 15 years ago, previously has used only male subjects in any studies, Fox said. It is located in the Physical Education Building.

The lab is working on interval training, composed of work (or exercise) interspersed with relief periods as a means of developing physical fitness, he said.

THE LENGTH of the relief (or rest) period depends on the time and intensity of the work. For example, “if you run 100 yards, you rest three times as long as the time it took to run that distance,” Fox said.

A ratio is developed between the extent and type of work, and the length of time for rest.

Fox and Mathews have been working with interval training since 1965. The research program receives funds from the Army, Navy and the Central Ohio Heart Association, Fox said.

FROM THEIR findings, the two men have developed a prescriptive exercise program for freshmen. Each student receives and follows an individual exercise prescription, Fox explained.

Fox said there are different types of fitness. “Short distance runners have a different fitness than long distance runners,” he said. “The short distance runner would not be physically prepared to run a marathon and a marathon runner isn’t prepared (or fit) for running short distances.”

The principle of interval training isn’t new, Fox added, but the scientific study of it is.

THE INTENSITY of work is judged by how high the heart rate goes, he said. “A higher heart rate means harder work,” but maximum heart rate does decrease with age, he said.

The lab has several ergometers, or work meters. There are some stationary bicycles in which friction can be adjusted to increase or lessen physical labor, and there are two large treadmills on which the speed and grade, or slope, can be adjusted.

The lab also has electronic analyzers to measure the amount of oxygen and carbon dioxide in a sample of air from a subject.

“FOR FITNESS, the intensity of work is important,” Fox said, “but in weight loss, the amount of energy expended is what’s important.”

The female subjects will be used in interval training this fall to see if there is any difference between their responses and those of the male subjects, according to Fox.

“Women seem to respond as well as, and in the same manner as men,” he said, “but we want to test it scientifically.”

The female subjects will be paid $100 per week, Fox said, training every day for about eight weeks.

“THE MONEY pays for any inconveniences to the subject and adds motivation,” he added. However, they must stay through the entire program or their results can’t be used.

Fox said 30 subjects are needed — 15 for fall, and 15 for winter.

Each training session will be supervised, with each work period timed in relation to each rest period, he said.

IN 1966, the Exercise Physiology Research Laboratory was studying the effect of high altitudes on athletes. The results were used in preparation for the Olympics in Mexico City.

Female subjects also will have a chance to exercise at altitudes, Fox said. The department of preventative medicine, where Fox is an associate professor, has a hypoboric chamber which simulates different altitudes and will be used for the research.
Department offers exercise education

By Cindy Legg 5-23-84
Lantern staff writer

If you suffer from a protruding waist or flabby thighs, or if that daily walk to class sends you straight back home for an afternoon nap, maybe you should start a regular exercise program.

The Department of Exercise and Physiology offers a safe alternative to the sporadic exercise spurts that are common among students who wait until spring break to try on their summer swimsuits.

The department offers testing to faculty and students for ideal body weights, body composition, oxygen consumption and stress, so they can plan a safe exercise program, director Bob Bartels said.

Serious dieters can determine their percentage of body fat through an underwater-weight test available at Larkins Hall for $3, he said.

The department also offers a course about life-time exercise programs, Physical Education 147.

The class, available every quarter, combines a specific activity such as running, weightlifting or swimming with a lecture that teaches students how to plan an exercise program with minimal health risks, he said.

While students have a variety of exercise options designed for their needs, the faculty can participate in a fitness program structured for older people, Bartels said. About 150 people already attend the swimming, aerobic dance and running sessions, he said.

Before they qualify for the program, faculty members must get a doctor's approval and then take a stress test so exercise physiologists can determine a safe level of exercise for them.

"For anyone over the age of 35, it is better to know the body's abilities before starting to exercise," Bartels said.

Bartels is a former OSU varsity swimmer and coach, and has been at OSU for 25 years.

He said people who are out of shape should be cautious about over-exercising. However, a planned exercise program is preferable to no activity, he said, because regular exercise reduces the risk of health problems later in life.

"Any exercise program is preventive medicine," he said.

Besides offering exercise advice and guidance, the department studies show how exercise affects people. This summer the department will study how two different levels of exercise affect the elderly, Bartels said.

Currently the department is studying how exercise affects muscular-dystrophy patients and hormone levels in men and women. It is also studying how weight training affects children, he said.

Marla Monnin, a freshman from Olmsted Falls, does jumping jacks at station five of the parcours Tuesday afternoon. Station five of the parcours is along the Olentangy River at Drake Union.
Wire you looking at me?

Kevin Enke, of Columbus, is being tested in the cardiac rehabilitation program at Larkins Hall. Enke had heart bypass surgery in April. The program is administered by the exercise physiology department.
Exercise prevents bone loss

By JODY SHUMAKER
Lantern staff writer

The key to healthy bones is more than just drinking a lot of milk. Women in their 20s and 30s need to start an exercise program to prevent osteoporosis later in life, said an OSU researcher.

Leslie Pruitt, a doctoral candidate in exercise physiology, is studying the effects of strength-training exercises on post-menopausal women. Most women experience menopause between the ages of 45 and 50.

Pruitt said it is important for college-aged women to work to prevent osteoporosis because bones can be built until about age 35.

Bone loss begins at age 35 and makes its most dramatic decline during menopause, she said.

Osteoporosis, meaning "porous bones," occurs when bone loss brings the overall bone density below a normal, healthy level.

Fractures occur more easily as bones become weaker and the spine begins to curve. Wrist, ankles and the lower spine are the most frequent areas of fractures, Pruitt said.

Estrogen-replacement therapy can slow bone loss during menopause. Some women however, such as those with a family history of cancer, can't use it, she said.

Immobilization for long periods of time, such as a hospital stay or having a limb in a cast, increases bone loss because the muscles are inactive.

Pruitt said muscles stimulate the bones during normal movement and exercise stimulates them even further, meaning a decrease in bone loss.

Medical factors like hormonal imbalances or digestive problems that block calcium absorption can also affect bone density, Pruitt said.

Robert Vickers, a spokesman for the Central Ohio Chapter of the Arthritis Foundation, said, "The key word is prevention, and it's (osteoporosis) a disease that can be prevented."

Women interested in participating in Pruitt's post-menopausal study should contact her at 293-6803.
Sept. 14, 1993

VOLUNTEERS SOUGHT FOR STUDY TO EVALUATE EXERCISE REGIMENS

COLUMBUS, Ohio -- People who exercise less than five days per week are being sought for a study at The Ohio State University Hospitals to evaluate the effects aerobic exercise and weight training have on weight loss and metabolism.

The study is designed for people enrolled in the Optifast weight reduction program at Ohio State and who are available for up to three days per week for 10 weeks to take part in exercise sessions.

Participants will be placed into one of three study groups and take part in either periodic aerobic exercise, weight training, or limited stretching exercises.

Study participants will receive free metabolic and body composition measurements, 10 weeks of structured exercise sessions, and an individualized exercise program to assist in successful maintenance of weight loss.

The study is being conducted by the Exercise Physiology Department at Ohio State and the Comprehensive Weight Management Program.

For additional information call 292-1001.

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Contact: David Crawford, Hospitals Communications, 293-3737
Free body fat tests offered to students

By James Majcen
Lantern arts writer

Students enrolled for summer classes have an opportunity to know a little bit more about themselves. Perhaps more than they would like.

Students majoring in exercise science are offering free body composition testing to all students enrolled this summer.

Willing subjects are needed to provide these students with experience to fulfill their class requirements.

The testing, which includes a skin fold test and an underwater weighing procedure, provides recipients with thorough information concerning body fat and lean muscle composition, said Mark Myhal, a doctoral candidate majoring in exercise science.

"The results will be helpful for anyone monitoring body weight," Myhal said. "It helps you watch what you're doing in a particular training regimen."

Many of the students participating are in health, physical education, and recreation classes, Myhal said. Students outside HPER can also participate.

A subject's body composition will be calculated from results of a skin fold test that measures external body fat. An underwater weighing procedure is also used to provide accurate fat measurements.

An average male college student's body fat is between 13 and 15 percent, Myhal said. Females' average fat content ranges from 22 to 25 percent.

Students interested in getting tested must sign up at Larkins Hall in room 129.