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The Effects of Weight Cutting

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from industrial plants may severely injure the surrounding vegetation and cause great economic loss. This is so important that some companies regularly employ plant pathologists to study these diffificulties in order to attempt to remedy the conditions and to appear as experts in the numerous damage suits that arise. Most of us know that ordinary city gas is injurious to house plants.

Unfavorable soil conditions such as too much alkali or the lack of an element may cause a disease. If the plant fails to secure enough iron, chlorophyll will not form and the plant dies of a disease called ''chlorisis''.

Unfavorable water conditions cause serious difficulties. A common disease caused by improper water relations is the ''blossom-end rot'' of tomatoes. This is characterized by a dry rot on the blossom end of either green or ripe tomatoes.

Space does not permit further discussion of these causes, but it is hoped that enough has been said to give some appreciation of the nature and significance of plant disease. Some of the common plant diseases of Iowa will be considered in later numbers of the Bulletin.

—C. W. Lantz.

THE EFFECTS OF WEIGHT CUTTING

Hygiene

During the last decade, wrestling has increased rapidly as a high school as well as a college sport. About this time of year in those high schools where wrestling is listed as an interclass or interschool sport, the coach is anxiously looking over the material available and trying to mentally arrange them into groups according to the classes in which they will have to compete. If we could look into his mind, we would almost surely find his mental processes running something like this;—''Now there is that man Jones, a sweet wrestler weighing 153 pounds, not fat either. If I can only cut him to 135 pounds he ought to be a consistent winner. Rather hate to do it—hard grind on him. Wish I knew what the future effect on his health would be. Suppose I will have to bring him down along with the rest of them or we wont stand any chance at all.'' We cannot very well blame the coach. It would be a pleasure to merely teach the boys to wrestle, but to have to compel them to go thru long periods of water and food abstinence as well as heavy sweating in order to get them down to a lower weight class is not so pleasant. He knows, however, that he will have to cut the weight of his squad if he is to turn out a winning team, because his men will have to be very superior in wrestling ability to win from opponents who have the muscular strength of individuals 15 to 25 pounds heavier than themselves.

Many wild rumors are afloat about the harm or lack of harm of weight cutting. With this in mind it shall be the purpose of this article to answer the question as best it can be answered from the small amount of material that is available.

In the first place we are naturally interested in the amount that it is possible to reduce the weight of an individual. Apparently no one knows how far it is possible to reduce weight without injury but it has been rather accurately established how far the weight may be reduced before death results. Dogs have been caused to lose 42 percent of their body weight thru water and food deprivation and still recover. Rabbits, on the other hand, usually die after losing only 32 percent of their weight. The author has several rats that have been dehydrated 25 percent of their weight several times and show no apparent ill results. Water constitutes 70 percent of the protein of the body. Rubner says that in starvation an animal may lose practically all of its glycogen and fat and half its body protein and live, but the loss of 10 percent of its water brings serious disorders, and the loss of 20 to 22 percent results in death.

Since most men who are obliged to cut weight any considerable amount usually resort to lessened food and water consumption as well as drying out in a hot bath or by exercising under heavy wraps, we should be interested in knowing to what extent this influences the natural water content of the body. Various experiments show that there is no great water reserve in the body at any time. If a surplus of water is taken into the body, it acts as a stimulant to the excretory processes of the kidneys, and thirst, the indication that the body is in need of water, will soon be felt. Some water is being formed constantly within the body by the metabolism of foods and this is of some use, but it can never compensate entirely for the water which is being withdrawn from the body in natural body processes. Air leaving the lungs is usually saturated, and the kidneys must continue to eliminate urea as well as other wastes and this is impossible without some water even tho the amount is materially reduced. Likewise the elimination of heat from the body requires the evaporation of considerable amounts of water in the form of perspiration from the skin.

The body must be able to form in the neighborhood of 1500 cubic centimeters of saliva each day as well as from 2000 to 3000 cubic centimeters of gastric juice and a like amount of intestinal juice, and a quantity of bile. These liquids are not excreted but they must be available in the body. Their necessity shows the importance of having a sufficient supply of water. Engles determined that the available water supply is mostly in the muscles and skin. The removal of water causes a general drying out but varies with the organs. The brain, heart, and skeleton lose little water while muscles which make up 42.8 percent of the body give up 67.89 percent of the total water loss. Durig determined that the withdrawal of 10 to 20 percent of their total water failed to impair the action of the muscles. This accounts for the fact that it is possible for athletes to dehydrate considerably without great loss in muscle efficiency. The same has been found to be more or less true of the skin.

What is true of the muscles and skin, however, cannot be said to be true of the entire body. Dehydration invariably results in an impairment of the circulation of the blood resulting in functional disturbances in all parts of the body. There is an alteration in metabolic processes, a disturbance of the heat regulating mechanism and a concentration of the blood itself. With regard to the latter Adolph found a concentration of 15 percent in the blood to have occurred with a 5 percent loss of body weight in a man when sweated in a hot bath. Keith was able to secure a blood plasma concentration in dogs of from 24 to 44 percent and a blood volume decrease of 38 percent. Under such conditions the specific gravity of the blood is markedly increased. Czerny found that the red cell count may be doubled, while Kapsinow is authority for the statement that the haemoglobin content may be 140 percent of normal. The serum protein content of the blood may be increased 50 percent or more. Later there is a destruction of red blood corpuscles and serum protein. The viscosity of the blood is markedly increased, so much so in fact in severe cases of dehydration, that fairly deep cuts will not bleed. The non protein nitrogen and urea nitrogen of the blood are increased. This is partly due to the increased destruction of body protein. According to Schloss, the blood sugar content is higher even to the extent of .2 percent. In severe dehydration the lactic acid content of the blood is high and there is an indication of a considerable degree of acidosis. The alkali reserve of the blood is diminished, partly at least as the result of a tendency for the bicarbonates to be excreted in the urine in larger than normal quantities. This action is often accompanied by a tendency to retain urea. Due to this loss of bicarbonates and accumulation of acids, the blood shows a lessened power of combining with carbon dioxide. There is also a decreased oxygen capacity in the haemoglobin.

Blood volume is regained slowly in severe cases of dehydration. There must first be a regeneration of destroyed cells and protein (Utheim, Keith, Marriot). If dehydration is continued for a period of time, there is a tendency for constriction of peripheral arterioles and a stagnation of corpuscles in the small peripheral vessels. The electrocardiogram shows a disturbance in the cardiac mechanism with a low amplitude in all waves. This condition resembles that which occurs in coronary sclerosis or the hardening of the blood vessels which supply the heart with blood. The pulse becomes weak and rapid while the blood pressure remains normal to low.

The effects of dehydration on the kidney are quite noticeable. The amount of urine is rapidly decreased as the colloidal osmotic pressure of blood approaches the renal pressure in the renal arterioles. Traces of albumen and casts are present in the urine. Reducing sugars are excreted, and evidence of impaired functional activity of the kidneys is shown by increased blood urea. There is a tendency for the retention of acids normally excreted causing an acidosis much the same as that in chronic nephritis.

The function of heat elimination is also seriously interfered with in moderate to severe dehydration. Fever is almost certain to occur when not enough water is present for evaporation. In some cases this is quite important, resembling desert thirst.

As to the ultimate effect of occasional mild dehydration, very little is actually known. Crisler reports that animals are much more susceptible to the effects of depressive drugs while in a dehydrated condition. There are some theories that resistance to disease is lowered, but little actual proof is available. Most animals show a remarkable and rapid recoverey from short periods of dehydration, but whether or not some functional disturbance remains is not well proven. Space does not permit a discussion of all the functional disturbances which may occur. However, it is not the purpose of this article to give advice with regard to the practice of weight cutting by means of dehydration or otherwise. There has merely been an attempt to set forth as briefly as possible the physiological effects which are definitely known.

H. Earl Rath.

ABOUT STATIC ELECTRICITY

I. What is a charge of electricity?

Static charges of electricity occur in two forms, viz.: positive charges and negative charges. We now know that a negative charge consists of an aggregate of small particles called electrons and that a positive charge consists of an aggregate of small particles called protons. These electrons and protons may with equal correctness be considered particles of matter or particles of energy. When they are considered as particles of matter we find that the mass of the proton is approximately equal to that of the hydrogen atom. The mass of the electron, which is the unit of negative electricity, is only 1/1800 of that of the proton.

According to the modern theory of matter, the atom of any element consists of a nucleus whose mass is made up mostly of protons, surrounded by revolving electrons. The protons in the nucleus are held firmly together by means of attracting electrons embedded