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into balance with water requirements as soon as possible.

"Control Tower" in the Brain

The physiological basis of thirst is not at all clearly understood. It is considered that the brain has a specific area which functions as a complicated computer. This area is connected to various nerves that form a system which samples the effective osmotic pressure of the body tissue, blood volume, and temperature receptors located at various parts of the body. It then transfers this information into appropriate actions for regulation of kidney activity and water consumption behavior. This specialized regulating center appears to be located in the hypothalamus, a small "control tower" located at the floor of the brain.

A research project has been under way the past two years to provide information which would give us a better understanding of the genetic and physiological basis of thirst and water requirements. For this research, the laboratory rat was used as the experimental animal. At the start, parental stock was obtained from a large number of different sources to provide a wide genetic base. The resulting litters (there are 10 to 14 in a litter) were weaned when they were 21 days old and immediately placed on test.

Tests were conducted in two environmental chambers. Chamber 1 was maintained at a constant temperature of 72° F. with 50% relative humidity. Chamber 2 was kept at a constant temperature of 95° F. with 35% relative humidity. Immediately after weaning, each litter was divided, with half of the animals maintained in each environment. They are numbered and kept in individual cages for a 13-week period. During this entire test period, daily water consumption was measured for each animal.

Measure Water Intake

This can be done accurately, since the water is provided in a glass bottle hung on the outside of the cage. The bottle has a small bent tube inserted through a rubber stopper, and the rat obtains water by licking the end of the bent tube. Thus, there is no water loss by evaporation or spilling. The rat is early maturing and reaches sexual maturity by 10 weeks of age. Thus, the 13-week test period takes the rat from weaning to approximately mature body size. Since 102° F. is the lethal temperature for the rat, this test period at 95° F. is about the same as a person remaining at a constant 105° F. temperature from 4 years of age until 18 years of age.

The rat has few, if any, functional sweat glands in the skin. He does, however, have sweat glands on the foot pad, as does the dog. However, there is still water loss through the skin, probably by a process of diffusion rather than secretion.

At the completion of the 13-week test period, selections were made on the basis of their water consumption. At each environmental temperature, selection of males and females was made for both high and low water consumption. Their progeny, in turn, followed the same test procedure as was done previously. Random-mated control animals were also included in the testing to provide a base for comparing the effectiveness of this selection procedure.

The animals adjusted to the high temperatures very well. By the second generation the death loss was less than 5%, about equal to that of the 72° F. animals. In fact, animals transferred from 95° to 72° F. after the test period appeared rather uncomfortable for several days. We have also found that fertility does not appear to be appreciably affected by the long residence at the high temperature.

The selection for high and low water consumption at the two environmental temperatures has been effective. Averages of the 13-week water consumption for the selected groups and the control group are given in Table 1. Although the average values show marked differences among the groups, there is still considerable variation within each group.

Great Range of Intake

In the high water consumption group there were some individual animals that consumed more than 10,000 cc. of water during the test. In fact, during the first few weeks, some animals actually drank more than their own weight in water every day. Other animals under the same conditions drank only one-tenth of this amount.

It was also noted that litters in the high water consumption group at 95° F. were not generally in the high consumption group at 72° F. Those that consumed the least water at 95° F. had litter mates which were also in the low group at 72° F.

Certainly, adequate water consumption is necessary for the greatest animal gain. Still, the gain in weight for these selected test animals is not at all in proportion to their relative water consumption, especially with the high water consumption group.

Blood samples have been obtained from the test animals for laboratory analysis. These data will be used to determine what effect the relative water consumption has on various blood constituents. This work will continue for at least two more generations, in order to provide adequate numbers of animals of each performance group for more detailed physiological and biochemical studies.

PARKER VALLEY'S RECLAIMED LANDS YIELD BIG CROPS

Bumper crops are being harvested from some 2,000 acres of reclaimed land in the Parker Valley of Arizona — the nation's oldest irrigation project.

Irrigation came to this section of the Colorado River Indian Reservation in Yuma County in 1867. But much of the land had to be abandoned because of a rising water table which allowed salts to accumulate in the root zones.

Faulty drainage prevented the excessive water, and salts, from being carried off.

Then in 1955, a soils and drainage study by the Bureau of Indian Affairs led to the reclaiming of 2,000 acres with indirect benefits spreading to an adjacent 1,400 acres.

Bureau engineers cut a 16-foot drainage canal 2¾ miles long through the abandoned or marginal lands. It was then flooded with water for 60 days.

The results were shown in salt surveys of 1956 and 1961. In 1956, the survey showed salt deposits of 100,000 tons. Five years later, the salt was reduced to 7,000 tons.

Elwin Hanna of E & M Farms leases about 600 acres of the land. His first wheat crops in 1956 yielded three-fourths of a ton per acre. He rotated his crops and last year the yield went as high as two tons an acre.

Dixie Ranches produced an excellent cantaloup crop this year as well as premium alfalfa hay on some 1,460 acres. Also doing well are cotton and grains.

Tim Dye, land operations officer, says a close watch on the water table continues and that further reclamation work will be done as funds are available.