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NaCl preference in the gerbil*

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Gerbil preference levels for salt solutions were determined by using the single-stimulus method. The concentration resulting in the largest acceptance was 0.9%, even though gerbils can utilize salt solutions as high as 6%. Since the single-stimulus method correlates well with other preference measures, these results should generalize to other testing procedures.

Gerbils have become popular experimental Ss for the study of mechanisms involved in water conservation. Studies have detailed their water requirements and the efficiency of their kidneys (Winkelmann & Getz, 1962). The effects of different types of food and food deprivation on water consumption (Boice & Arledge, 1968; Reynierse et al, 1970) have also been described.

While the above studies generally offer support for the similarity of consummatory behavior between the gerbil and the laboratory rat, there are exceptions. Rats drink less water when food deprived, while gerbils actually drink more, often becoming polydipsic (Reynierse et al, 1970). Gerbils appear to be able to utilize higher concentrations of salt water than rats (Winkelmann & Getz, 1962).

The NaCl concentration which is preferred by rats has been shown to be about 0.9% (Weiner & Stellar, 1951; Young & Falk, 1956), but such data is not available for the gerbil. The experiment reported here sought to determine gerbil preference levels for salt solutions using the single-stimulus method (Weiner & Steller, 1951). This method involves the presentation of only one solution at a time, and therefore the animal is not required to make a choice between solutions.

METHOD

Subjects and Apparatus

Eleven gerbils averaging 59 g at the start of experimentation were used. Seven were males and four were females.

Each gerbil was housed individually, and the cage contained a food cup and graduated drinking tube. All animals were fed a salt-deficient diet (Hartcroft formula, General Biochemicals) during the entire experiment.

Procedure

The following schedule was employed to test solution preference by the single-stimulus method, modeled after Weiner and Stellar (1951).

TIME	PERIOD	HOURS	FLUID	FOOD
11:00 a.m.-12:00 Noon	Test	1	NaCl	None
12:00 Noon-2:00 p.m.	Rest	2	None	None
2:00 p.m.-4:00 p.m.	Water	2	Water	Food
4:00 p.m.-11:00 a.m.	Deprivation	19	None	Food

During the 19-h deprivation period, food, but not solution, was available. At the end of the deprivation period, the food was removed from the cage and one of the test solutions (0.1%, 0.3%, 0.9%, 1.5%, or 6.0% NaCl, mixed according to a weight/volume formula) was placed in the cage for 1 h (test). Total intake for the hour was measured.

After the test hour, there was a 2-h period (rest) when the animals received no food or water. Each animal was weighed each day during this time.

Total intake of each salt solution during the test period was measured over 4 consecutive days. On Monday at 4:00 p.m., the schedule started and on Friday, after the water period, it ended. From Friday at 4:00 until Monday at 4:00, all animals had ad lib access to food and tap water.

RESULTS

The mean 1-h intake of NaCl and water over the 4 test days for each NaCl concentration is shown in Fig. 1. It can be seen that the maximum intake of NaCl occurs at a concentration of 0.9%. When the 6% NaCl solution was offered, most animals rejected it entirely (the mean consumption was only 0.2 ml) and chose the water instead. An analysis of variance indicated a significant difference between NaCl concentrations ($F = 10.37$, $df = 4,40$, $p < .01$).

DISCUSSION

The concentration of NaCl which results in the largest acceptance is 0.9%, the concentration maximally preferred by rats as well. It was at that concentration that more salt solution was consumed than tap water. When concentrations above 0.9% NaCl were presented, the intake of the salt solution fell off and water intake increased.

Previous data has shown that gerbils can utilize salt solutions as high as 6% (Winkelmann & Getz, 1962), obtaining some water from this highly concentrated solution. Animals maintained for 6 weeks on a 6% salt

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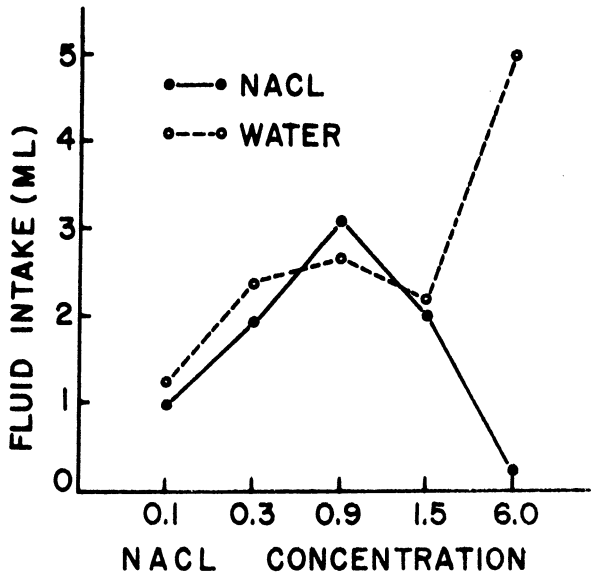

Fig. 1. Mean NaCl and water intake for each salt concentration employed.

solution were able to maintain their body weights. In spite of this, gerbils prefer weak salt solutions and will reject, almost entirely, a 6% NaCl solution if not too severely deprived.

Since previous studies have demonstrated that the concentration maximally preferred, as determined by the single-stimulus method, correlates well with other preference measures, these results should generalize to other testing procedures. If so, the similarity of the point of optimal acceptance for NaCl solutions for the rat and gerbil would be established.

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