

NOTE: EXEMPTION FROM FEEDING STANDARD

Caloric Restriction: Animals in column E are placed in this column because they are food restricted and do not receive analgesics or anesthesia. We were advised by the USDA inspector to count the food restricted animals in this column, although in reality, 75% food restriction does not cause pain and distress, but instead increases cardiovascular health, and adaptive behaviors. It is well known that laboratory rodents fed unlimited amounts of laboratory chow are obese, insulin resistant, and atherosclerotic (Martin et al., 2010). The main topic of investigation in our laboratory is the effect of food restriction on health and behavior, thus, food restriction is both necessary and healthy.

When animals are fasted or food restricted, effects on fertility and ovulation occur long before any other adverse health consequences (Merry and Holehan, 1979; Merson and Kirkpatrick, 1981, Bronson, 1989). This is because animals have a sensory system designed to detect internal energy availability (Schneider, 1992). The sensory detectors of fuel availability send signals to parts of the brain that control fertility and ovulation as well as those areas that control hunger, food intake and caloric homeostasis. My experiments are designed to study the mechanisms that underlie this link between energy and fertility. Thus, in most experiments, hamsters are fasted or food restricted to a degree that decreases sexual motivation, but not to a degree that causes health problems. This is possible because the reproductive system is affected prior to any effect on general health. We have found the 75% food restriction for between 4 and 16 days is a better model with very few animals showing adverse side effects.

The current concerns regarding the rising incidence of obesity and diabetes suggests that the traditional method of housing laboratory animals, in isolation, in small cages with as much food as the animal wants with no exercise requirements to obtain the food is unnatural, and less healthy than housing animals in cages where food is limited and where they can forage, explore and interact with conspecifics (Rowland et al., 2008) and (Martin et al., 2010)).

A great deal of information on the effects of food deprivation on reproduction in Syrian hamsters comes from work in my own laboratory or in the laboratories of Drs. George N. Wade (e.g., Schneider and Wade, 1989, myself (Schneider, 2014), Lawrence P. Morin (Morin, 1986) and Neil Rowland (Rowland et al., 1982). For example, Dr. Morin (Morin, 1986) found that a 48 hour fast on days 1 and 2 of the estrous cycle induced anestrus, but this fast had no other health effects. We are only using 75% food restriction, not fasting. Animals will be weighed frequently, and their body temperature noted by feeling their paws and ears. If animals are cold to the touch or lethargic or appear to be in distress, their cages will be placed on a heating pad and they will be returned to ad libitum feeding. If they do not eat voluntarily they will be fed a 25% glucose solution. If they refuse to eat the glucose will be given by gavage (gastric intubation). This is not expected to be necessary.

The justification for not giving anesthetics or analgesics is obvious, i.e., food restriction does not cause pain and distress. In addition, opiate analgesics are not appropriate because we are measuring indices of estrous cyclicity, which is under control of hypothalamic luteinizing hormone releasing hormone (LHRH), also known as gonadotropin releasing hormone (GnRH). LHRH and LH levels are adversely affected by opiates because it is well-known that opiates and opiate derivatives, including analgesics such as buprenorphine, butorphenol and morphine, affect pituitary hormone secretion and hypothalamic LHRH (References 6-17 below).

References regarding Food Restriction

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