A MANUALLY OPERATED PELLET FEEDER FOR PRIMATES IN SPACE FLIGHT

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In space flight, behavioral research food dispensers must operate with minimal electrical power. Figure 1 shows a primate-powered pellet feeder developed to test a manual operation concept. It requires approximately three joules of electrical energy for each pellet delivery whereas a standard dispenser requires 209 joules per operation. The pellets are delivered by the dispensing wheel and ratchet. The engaging pawl is mounted with a compression spring to maintain it in an "engaged" or "not-engaged" position. With the pawl engaged, as shown, a pull on the operating lever will rotate the dispensing wheel. A pellet drops into the delivery tube when

the operating lever reaches its excursion limit. The engaging pawl rides over a spring-loaded latch (not shown) and as the spring-controlled operate lever returns, the pawl snaps into the not-engaged position. Further pulls on the operating lever are non-productive.

When the delivery of another pellet is desired, an 80 msec 24-v dc pulse to the solenoid will activate its plunger to drive the pawl back into the engaged position. Coincident with this action the signal lamp is activated with a lock-up relay circuit (not shown). The succeeding lever pull will deliver another pellet. The micro switch is used to break the signal lamp circuit. During initial conditioning some subjects grasp the lever but do not pull it. In this instance, the training plunger can be attached so that the experimenter can provide the operating force until the pulling response occurs.

This feeder has been tested with chimpanzee subjects that manipulated a separate panel lever on an FR 50 schedule to engage the feeder lever. The feeder signal lamp was used as the discriminatory stimulus for the operate lever. The subjects readily learned to operate the feeder. For space flight utilization, the pellet hopper and delivery system will be replaced by a more appropriate mechanism.

Fig. 1. Manually operated pellet feeder.