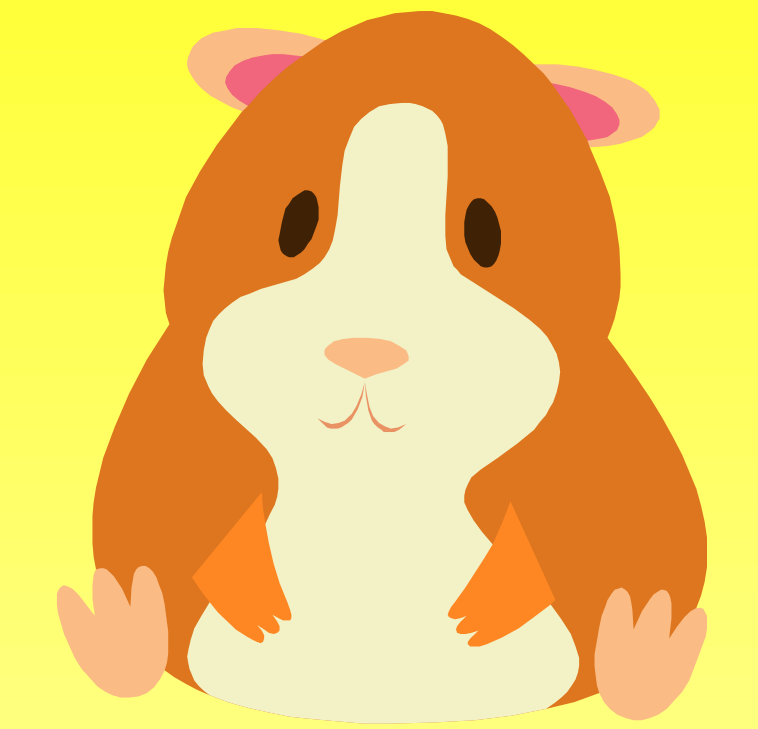


DIFFERENTIATING BETWEEN RATE OF GASTRIC FILL, BULK INTAKE AND CALORIES AS SIGNALS FOR

CONTROL OF REPRODUCTION

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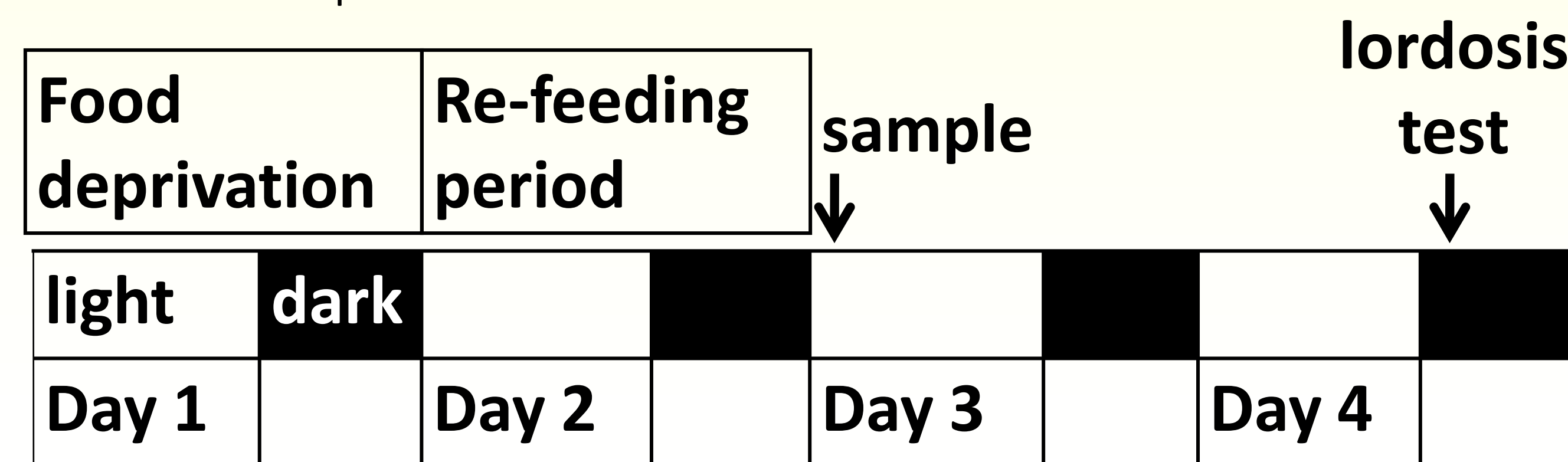
Introduction:

Previous experiments in our lab showed that hamsters fed diluted diets do not show normal 4-day estrous cycles, unless they are able to increase intake to compensate for the lack of caloric density of a diluted diet, indicating that caloric intake is a more potent regulator of reproductive function than gastric fill. The current experiments investigated the effects of diluting the energy content of meals with non-nutritive bulk on reproductive function in the hamster and whether diluted diets influence the rate of stomach emptying.

Experiment 1:

Hypothesis: A minimum number of calories is required to maintain reproductive function (lordosis, pregnancy, normal litter sizes and pup weights) after 24 hours of food deprivation

Prediction: Animals fed diluted diets and not allowed to overeat will not show normal reproductive function



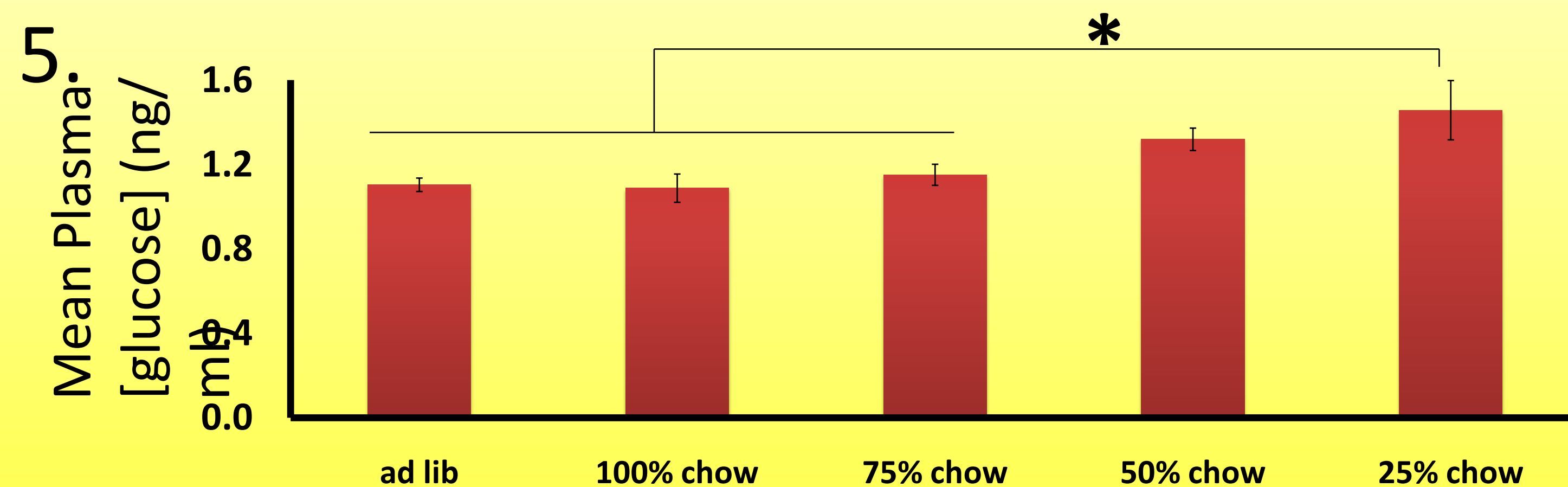
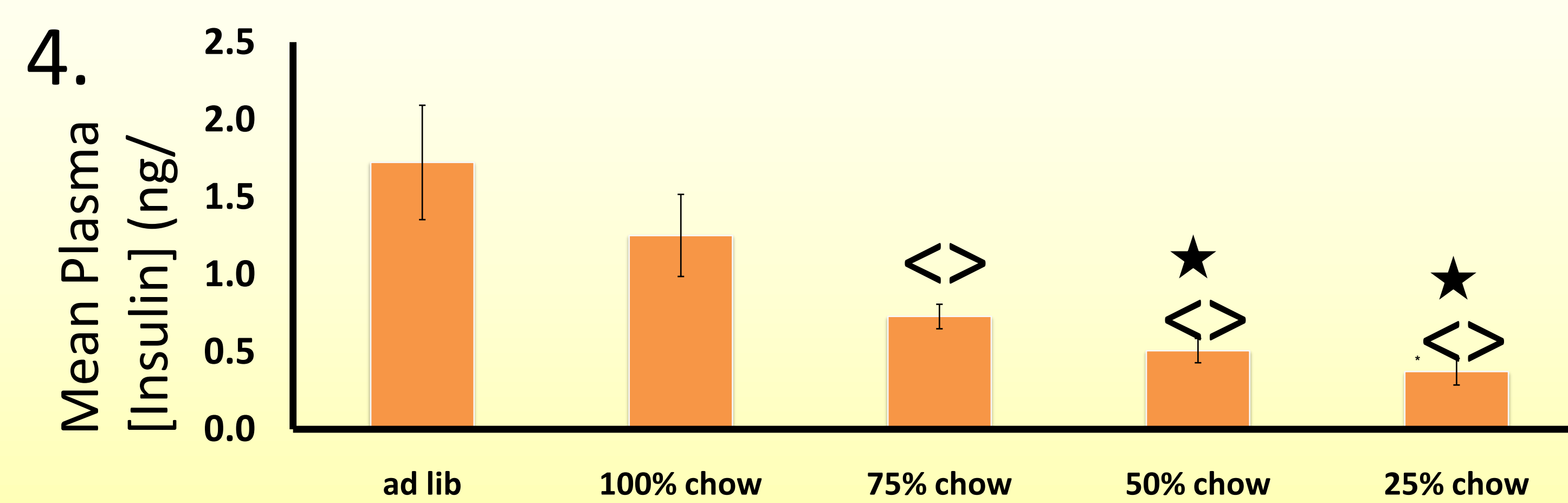
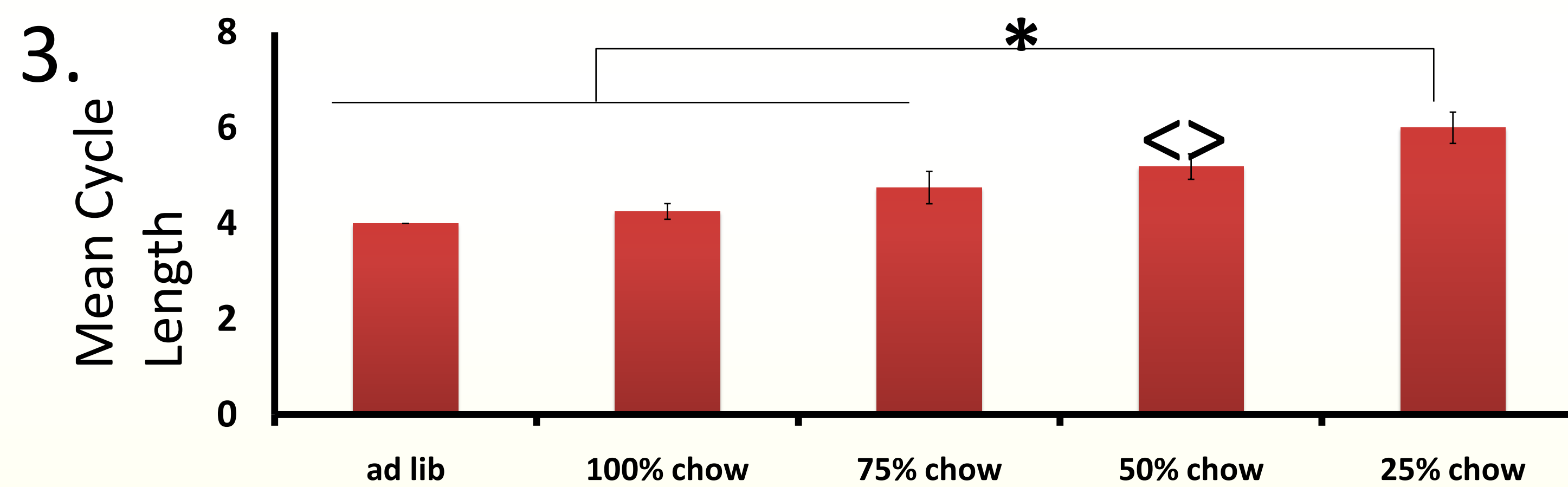
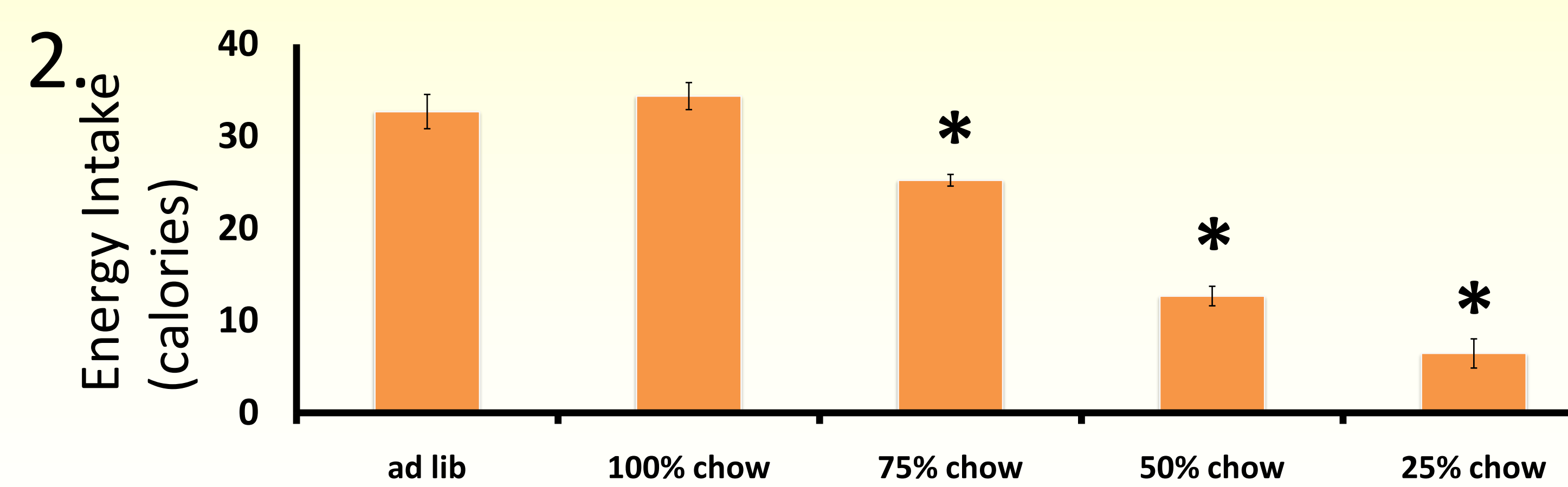
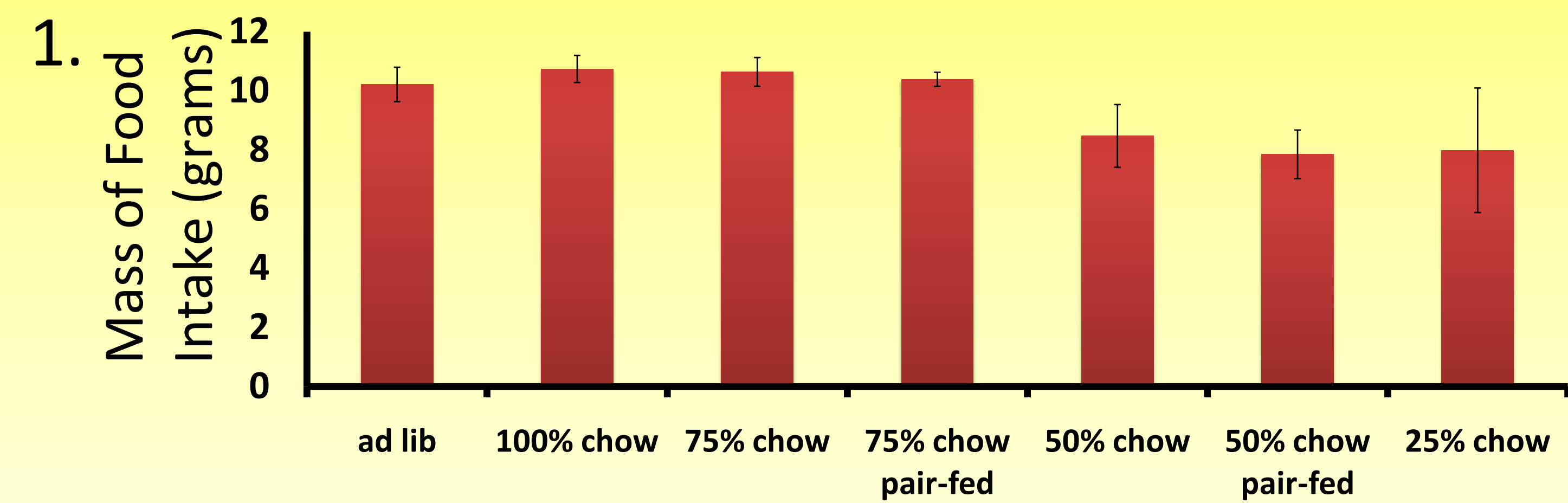
Methods:

- Experimental groups:
- FD 24 hours then re-fed 100% chow (n = 8)
 - FD 24 hours then re-fed 75% chow (n = 8)
 - FD 24 hours then re-fed 50% chow (n = 8)
 - FD 24 hours then re-fed 25% chow (n = 8)
 - *ad libitum* fed throughout day 1 and 2 (n = 8)
 - FD 24 hours then re-fed 75% chow paired to *ad libitum* group (n = 8)
 - FD 24 hours then re-fed 50% chow paired to *ad libitum* group (n = 8)

Estrous cycle length was measured for hamsters in all experimental groups. All hamsters were tested for lordosis on day 4 of the expected cycle. Once a positive test for lordosis was observed, the stimulus male was allowed to mate and then left in the female's cage for one hour. Four days after mating, the females were tested for lordosis once again. A negative test for lordosis indicated pregnancy. Pups were counted and weighed on post-natal day 1, 2, 5, and 10, and the number of pups was counted.

Results:

1. The mass of food eaten during day 2 did not differ significantly among the groups fed different diets.
2. The calories consumed decreased with diet dilution.
3. Groups fed diluted diets show a significant decrease in the percentage of hamsters showing a 4-day estrous cycle compared to *ad libitum* animals.
4. The mean plasma concentrations of insulin in the 25% and 50% chow groups were significantly lower than those of the 100% chow and *ad libitum* groups, and the mean plasma insulin concentration of the 75% chow group was lower than the *ad libitum* fed group.
5. The mean plasma concentrations of glucose in the 25% chow group were significantly higher than those of the 75% chow, 100% chow, and *ad libitum* fed group.
6. All hamsters were allowed to mate when they showed lordosis, and all mated hamsters got pregnant. Litter sizes and pup weights did not differ significantly among groups at any time.

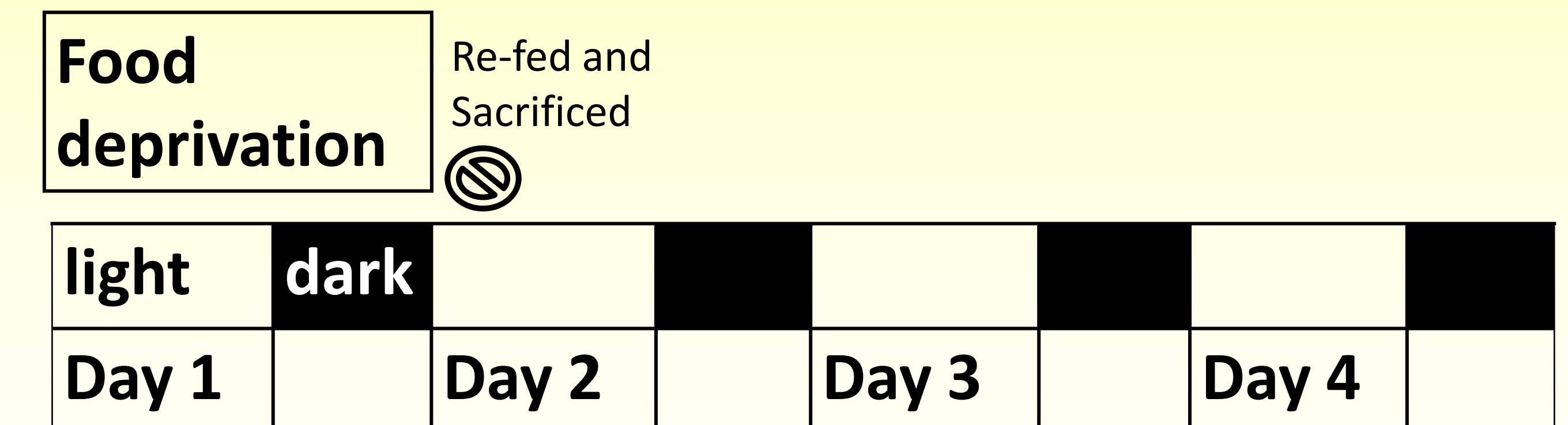


* = significantly different from all other groups (p < 0.05)
 ★ = significantly different from 100% chow
 <> = significantly different from *ad libitum*

Experiment 2:

Hypothesis: The rate of gastric emptying in Syrian hamsters is the same for all dilutions of a given diet.

Prediction: Animals fed diluted diets and not allowed to overeat will not show normal reproductive function



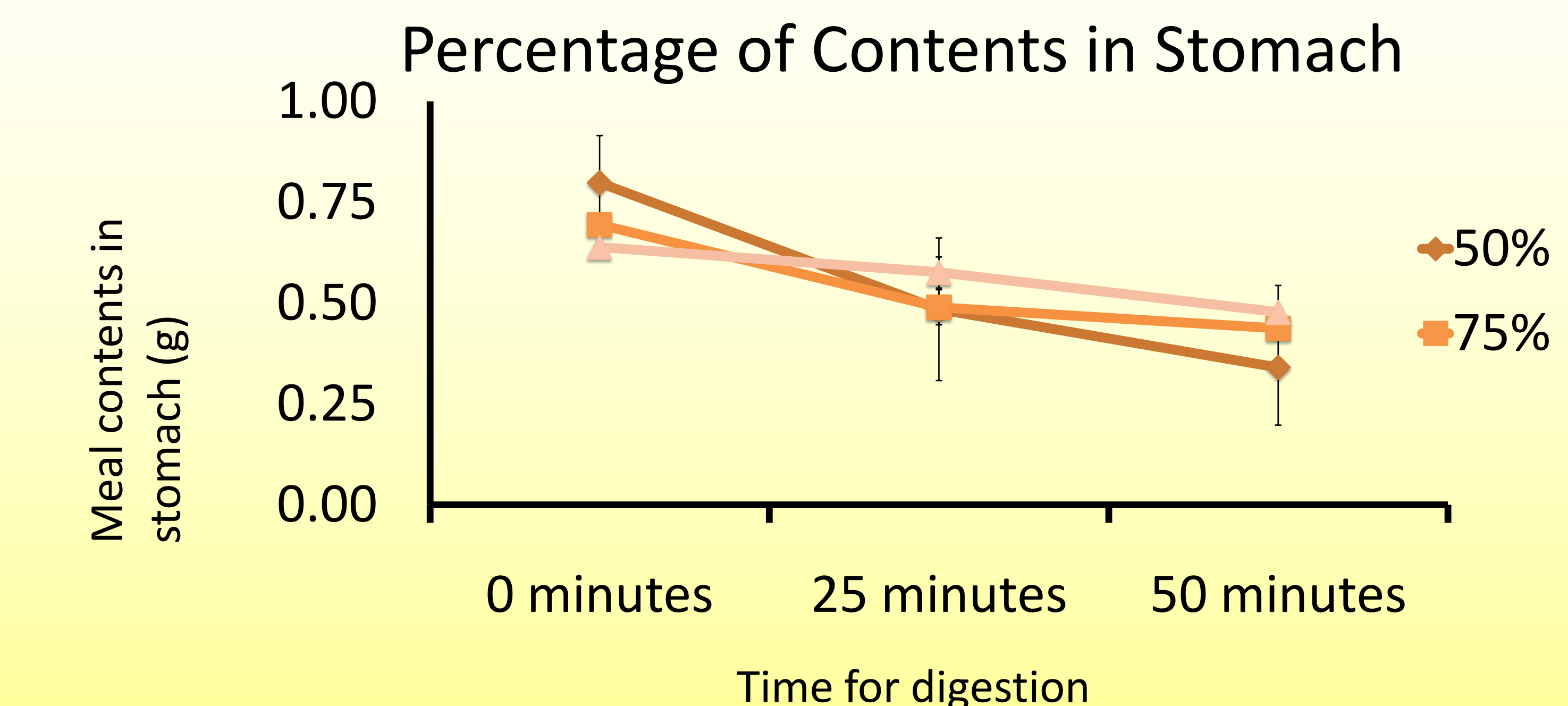
Methods:

Experimental groups:	Diet		
	50 %	75%	100%
0 minutes	N = 6	N = 6	N = 6
25 minutes	N = 6	N = 6	N = 6
50 minutes	N = 6	N = 6	N = 6

A separate group of hamsters were food deprived day 1 of the cycle and sacrificed on the morning of day 2 to serve as an empty stomach control group (n = 6).

Results:

The rate of gastric emptying, expressed as the percentage of the meal left in the stomach, did not differ significantly among the groups fed different diet dilutions



Main Conclusions:

Calories provide a more potent signal of food intake to the reproductive system than gastric fill. Also, the rate of gastric emptying was not significantly altered by diet dilution, so signals from bulk intake and gastric fill did not provide adequate stimulus to maintain normal estrous cyclicity after 24 hours of food deprivation. The availability of metabolic fuels from calories eaten provides a more important signal for reproduction than signals from bulk food intake or gastric fill.

Acknowledgments:

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