# Feeding Modality and Saturation Response in the Jaws of New Zealand White Rabbits

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Cyclical loading causes bone formation, however, there is evidence that found that prolonged periods of continuous loading can cause a reduced bony response to the loading stimulus as the cells become desensitized (i.e., a saturation response). A rest period of three hours allows bone cells to become responsive again. The questions posed are [1] does saturation response occur in the skull, [2] is a rest period necessary, and in non-rodent mammals? I measured the cross sectional area (Ct.Ar) and cortical thickness (Ct.Th) of the mandibular corpus at the first molar in 30 male rabbits.The rabbits were raised from weaning(5 weeks) to 48 weeks of age and divided into three treatment groups (n=10 each): unimodal (continuous access to food for 9.5 hours), bimodal (two 2.25 hours feeding periods separated by five hours rest), and trimodal (three 1.5 hours feeding periods separated by 2.5 hour rest periods). Cranial lengths (body size proxy) did not significantly differ among groups, thus rather than scaling measurements to cranial length, they were instead scaled to the mean food weight consumed per day. Results show that Ct.Ar scaled to mean food consumed is significantly greater (ANOVA $P<0.001$) in the bimodal than the other two groups, with no significant difference between the unimodal and trimodal groups. There was no difference in Ct.Th at any site, but the greater Ct.Ar demonstrates that a saturation response occurred in the unimodal group, while the five-hour rest in the bimodal group allowed for a greater bony response. The trimodal group also experienced a saturation response, likely because the 2.5 hours rest was not long enough for renewed sensitivity to loading. This is the first evidence of a saturation response in a non-rodent and non-limb part of the skeleton.

**Awards Won:**