Feedback circuits between the gastrointestinal tract and the brain are vital for the regulation of food consumption. It has been hypothesized diets high in fat induce inflammation in tissue essential for caloric regulation, causing a disturbance in patterns of food consumption and contributing to the development of obesity. In this experiment we measured levels of inflammation in three regions of the intestines of rats fed on long-term control chow, 10% fat, or 45% fat diets. We monitored food intake, assessed patterns of consumption, tracked body weight gains and fat for all three groups. We found significantly increased levels of inflammation in the 10% and 45% fat groups compared to the chow controls. The amount of inflammation was also influenced by the location along the gastrointestinal tract. Patterns of consumption such as number of meals a day, calorie intake per day, and satiety ratio, as well as changes in body weight and body fat, were statistically different based on diet condition. The results are consistent with the hypothesis that high fat diets disturb food intake control and body weight regulation by producing inflammation in the gastrointestinal tract.