

# Fat Thoughts and Fat Content Do Not Affect Eating Behavior in Women

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## Abstract

The present study examined if the perception of fat and the content of fat in a food affect the cumulative curve of food intake and chewing among healthy women. One group of 11 women was served the same food twice, the food contained 2.5g fat/100g. They were informed verbally and by labeling that the food had a high fat content on one occasion and that it had a low fat content on the other. Another group of 13 women was also served the same food twice. In one condition the food contained 9g fat/100g and in the other it contained 3.1g fat/100g. The women were not informed about the fat content of the food. Cumulative food intake was measured using Mandometer<sup>®</sup> in both experiments and combined with video recording of the maxillary-mandibular region in the second, to measure the size of the bites, the sequences of chewing, and the pauses between bites. Labeling food “high fat” or serving food with a high fat content increased the perception of the fatness of the food but had no effect on food intake. Chewing was also unaffected by the fat content of the food. As a consequence, energy intake was markedly increased when the fat content of the food was increased. The results suggest that neither the thought of fatness nor the fat content of a food affect the cumulative intake of food and that energy intake can increase in the absence of a change in eating behavior.

## Background

Women can be divided into those eating at a decelerating or constant speed over the course of a meal [1]. While decelerated eaters maintain their food intake, linear eaters lose control when experimentally challenged to eat quickly or slowly [2] and patients who have lost control, i.e., those who are under- or overweight, display a linear pattern of food intake [3]. Food intake is measured and experimentally manipulated using Mandometer<sup>®</sup>, a scale connected to a small computer, the subject removing food from a plate placed on the scale and adapting her/his speed of eating through visual feedback from the computer screen while eating [1]. Simultaneous video recording of the mandibular-maxillary region of the subject, thus synchronizing food intake with chewing behavior, has demonstrated that decelerated eaters take fewer and smaller bites by the end of the meal [4]. Because Mandometer<sup>®</sup> has been proven effective in treating both under- and overweight patients [5,6] and because the decelerated eater may be protected from losing control over body weight, the present study examined if this pattern of food intake and the associated pattern of chewing are affected by the information about the fat content of the food and the actual fat content of the food. Because the energy density of foods has been reported to enhance energy intake by increasing the speed of eating [7], it was hypothesized that an increase in the fat content of the food would increase food intake and the rate of deceleration and decrease the duration of the meal and the bite size by the end of the meal.

## Methods

**Participants:** Healthy women, who were 22.3(2.3) years old and had a BMI of 22.1(2.1) kg/m<sup>2</sup>, were recruited by advertisement on a nearby university campus.

**Procedure:** The women were informed about the project, ate a meal (mixed vegetables and grilled chicken cubes; 385kJ, 9.3g protein, 8.0g carbohydrates, 2.8g fat/100g, Findus AB, Bjuv, Sweden), using Mandometer<sup>®</sup> and the anatomy of their mouth region was video recorded in an introductory meeting.

One group of women (n=11) was served pasta with minced meat and a cheese sauce (427kJ, 6.1g protein, 13g carbohydrates, 2.5g fat/100g) on two occasions. On one occasion, the women were verbally informed that “the

food has a high fat content", and on the other, they were informed that "the food has a low fat content" verbally and by labeling. Approximately 700g of food were presented in a lunch box, labeled either "high-fat" or "low-fat" in random order. The women served the food on to a plate and placed the plate on the scale of Mandometer®. They were encouraged to serve themselves and eat as much as they wanted.

Another group of women (n=13) ate macaroni with minced meat and a sauce that varied in fat content. Whipped cream (40% fat) was used in the high-fat condition (754kJ, 6.3g protein, 17.8g carbohydrates, 9g fat/ 100g), and milk (3% fat) was used in the low-fat condition (536kJ, 6.5g protein, 18.0g carbohydrates, 3.1g fat/100g). The women were not informed about the fat content of the food. The procedure was identical to that used in Experiment 1, but the meals were also video-taped.

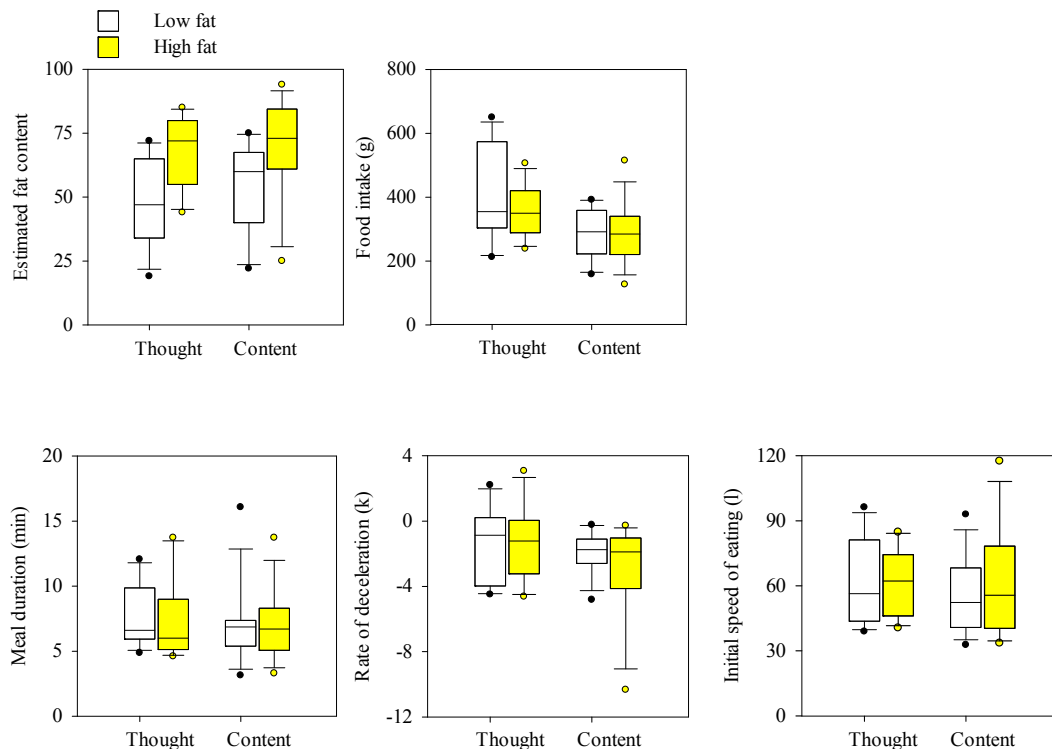
The women were asked to estimate the fat content of the food in both experiments from "not at all" (score=0) to "extremely/very" (score=100) after eating the food.

**Ethical statement:** The procedures were approved by the Central Ethical Review Board of Stockholm.

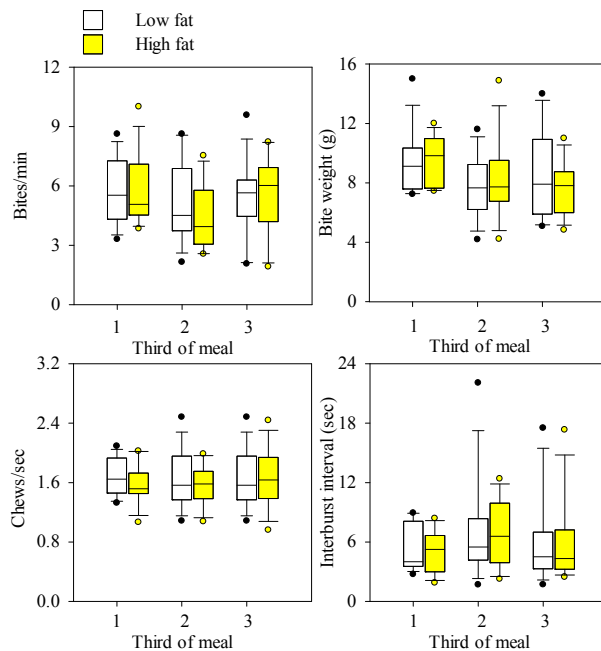
**Data analysis:** Food intake was modeled by  $y=kx^2+lx$ ; where  $y$ =food intake,  $k$ =rate of deceleration of the speed of eating and  $l$ =initial speed of eating. Results are shown as box plots. Meals were divided into thirds and the number and weight of bites, the rate of chewing, the duration of bursts of chewing and pauses between bursts are shown as box plots as described before [8] and analyzed using two-way ANOVA for repeated measures and Tukey post-hoc tests (Sigmaplot 12, Systat Software, Inc. Point Richmond, CA).

## Results

The perception of the fat content of the food increased to the same extent by labeling iso-energetic food as low or high in fat content or by increasing the fat content of the food, but neither procedure affected the cumulative curve of food intake (Figure 1). Simultaneous measurement of chewing showed that an increase in energy content of the food had no effect on eating behavior (Figure 2).



**Figure 1.** Estimation of fat content in a food labeled Low or High fat (Thought) or of a food with Low or High fat content (Content) and cumulative food intake in women.



**Figure 2.** Bite size and weight, chewing and intervals between bursts of chewing in women.

## Comment

While women, and probably men as well, can be induced to think that a food is low or high in fat content, although its fat content has not been changed, neither this maneuver nor a de facto increase in the fat content of a food significantly influenced their food intake. Also, eating behavior, i.e., chewing, was not affected by the fat content of the food. As a consequence, energy intake was markedly increased. Although the speed of eating was not determined by thoughts of fat food or by fat contents of food in the present study, it cannot be excluded that the differences in e.g., flavor and texture were too small to significantly affect eating behavior. Also, the subjects were healthy young women and they might not be as concerned with weight management to the extent that other groups of consumers are. These factors deserved attention in future experiment and other factors of potential interest include the physical characteristics of the food.

## Acknowledgments

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