Reviewer's report

Title: The effects of increased dietary protein yogurt snack in the afternoon on appetite control and eating initiation in healthy women

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Reviewer: Didier Chapelot

Reviewer's report:

This study aims at determining the power of a naturally high-protein dairy product to increase satiety compared to its lower protein version. It is now well established that proteins have a greater satiety power than fats or CHO, but high-protein foods are not always adapted to all eating occasions, specially snacks, and enhancing the protein content of snacks that could easily be introduced on a large scale in dietary habits, could be useful. The procedure fulfills the multidimensional evaluation of satiety (assessment of intensity, duration and further intake) considered by the reviewer as the best approach of satiety to this day. The sample size (n = 32) is rather high compared to other experiments in this domain and represents one of its strengths. The absence of a control condition could be considered as a weakness (precluding to infer whether the snack alters satiety or not) but does not compromise answering to the initial hypothesis. The manuscript is unfortunately quite short, several informations lacking (see below), and even if no differences were observed between the two experimental snacks, more details would have been needed. The discussion is in particular very poor.

Major Compulsory Revisions

1 - Why were subjects allowed to request their dinner only when scales were filled, leading to a 30 min fixed delay between conditions? This seems relatively hard to explain given such a procedure artificially reduces the sensitivity of the measure (most of differences in durations are lower than 30 min). References cited do not consist in studies showing that this question provided with VAS every 30 min is appropriate to determine duration of satiety but only that VAS scores are reliable for assessing satiety.

2 - The statistical analysis plan should be clarified and improved. Thus, why no ANOVA for repeated measures were conducted and only paired t tests for comparing AUCs? The two are complementary and the former may reveal some transient differences that the single-value AUC result may miss. Moreover, the analysis of VAS data derived from freely requested meals should not by definition stop at a given time-point. Although this delay was apparently very similar between conditions and across subjects (2:43±0:06 and 2:41±0.04 h), a retrograde analysis would have added some information on the motivation to eat over the preprandial phase. Furthermore, if some subjects have requested their meal 120 min following the consumption of a snack, the number of subjects is not 32 at 150 min in one or both conditions. Please specify. Last, why differences in
time to dinner request between conditions were not modelized in the multilinear regression? Or is the difference was actually the dependent variable of the regression in the present analyses? Actually, the predictors entered in the model are not clear for the reviewer.

3 – I disagree with authors on the last paragraph of their discussion. Perceived hunger should not replace spontaneous meal request because they found a significant (and very weak) correlation between these two variables, and 80 mm should not be considered as a universal threshold for meal triggering. A long experience in the domain shows that there is a large interindividual variability in the way the space of these scales (actually horizontal lines) is used by subjects and that a significant proportion of them reach 80 mm long before asking for their meal and only ask it in the 90-100 mm interval. To establish 80 as a hunger threshold, authors should have done complementary statistics and analyses of individual data.

Minor Essential Revisions
Method – Participants.
4 - How authors managed the putative usual ovulatory cycle effect on their results?
5 - How the absence of eating disorders was assessed? And was there any estimation of the subjects’ restrained eating status given the pivotal role of this psychic trait in spontaneous eating behaviour?
6 - Was there any attempt to match sensory characters of the two snacks? And was this evaluated?

Method – Experimental design.
7 - Why do authors chose a fixed lunch energy load (500 kcal for all subjects)? Thanks, justify this approach compared to alternative ones (energy – body weight ratio, percentage of energy requirements, usual energy intake at this meal…)
8 - Please specify the type of scales used for palatability assessment.
9 - Was there any kind of dietary counseling for matching diets on days prior to each test session?

Results.
10 - Was perceived hunger the only or the best predictor? If the answer is the latter, which other factors were also predictors?
11 - Energy intake prior to dinner meal was low for young women (960 kcal) and even after the ad lib dinner meal (#700 kcal), only reached #1660. Authors should discuss this point.

Conclusion(s)
12 - The end of the last sentence is dubious. “protein-related improvements in markers of energy intake regulation” is a rather inaccurate formulation for summarizing the present results.

Figure 1.
13 - “paired-sample t-tests; *P<0.05” is not necessary since there was no significant difference. Moreover, the only * symbol in the figure is for the unity (mm*150 min) and should be replaced by a point.

14 - The level of motivation to eat after dinner would have been interesting to show (or evaluate), to verify whether subjects had actually eaten until satiation.

Discretionary Revisions

Background section

15 - Lines 3-4. The definition of a snack as “any eating occasion outside of a typical meal time” is more a cultural than a physiological one and alternative ones are proposed (Chapelot, 2011). It would have been cautious to moderate the sentence claiming the definition of snacks.

16 - Lines 9-10. References cited are not exactly relevant to the effects of protein on “appetite control, satiety and regulation of energy intake” but on weight loss achieved and maintained. Although this may actually result from effects of protein on appetite, satiety and energy intake (that would each need a specific definition), this is not similar. Thus, a hypothesis is that protein may actually impair appetite control and regulation of energy intake leading individuals to eat less than their energy requirement, resulting in a negative energy balance. Authors should have chosen to cite references supporting the effects of protein on appetite, satiety and intake, or to do a statement in agreement with cited references. References 11 and 12 are finally more appropriate than these ones.

Data and statistical analysis.

17 - It’s not clear why ref. 15, 16 and 18 were cited to support the power calculation and the necessary sample size of 32 since these studies involved 11, 27 and 46 subjects, respectively, and only the first included an assessment of satiety by duration. For VAS scores, a number of subjects of 18 has been proposed to detect a significantly relevant effect (de Graaf, 1993).

Method – Experimental design.

18 - Line 12. Satiety is not strictly gastric fullness but a non-hunger state and therefore should be preferentially used as the generic name for hunger, appetite, prospective consumption and gastric fullness (and other possible indices). This would allow a “common ground” terminology. It is however true that “motivation to eat” is a usual term for these various sensation ratings but rarely satiety is limited to fullness.

Discussion.

19 - In the Poppitt et al. study (ref. 18), the 5 g and 20 g protein preloads were beverages and not snacks per se and provided 20 and 80 kcal, respectively and not 80 and 200 kcal as written. The Chapelot & Payen study (ref. 25) could have been added in the paragraph about high versus low-protein snacks since, as the Marmonier et al. study, snacks differed in protein content without being sensorally similar as in the present study (which is a strength of the latter). Moreover, the protein content of the snacks in the Chapelot & Payen study (3 vs 10 g) was more similar to this study than the Marmonier et al. even if the energy
load (#300 kcal) was greater.


**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

'I declare that I have no competing interests'