

TeRiFiQ

Project no. 289397

Combining Technologies to achieve significant binary Reductions in Sodium, Fat and Sugar content in everyday foods whilst optimizing their nutritional Quality

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Deliverable D6.5

Report on consumer behaviour in real-life conditions and recommendations for product pricing, marketing and labelling

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PU Public (must be available on the website)	<input checked="" type="checkbox"/>
PP Restricted to other programme participants (including the Commission Services)	<input type="checkbox"/>
RE Restricted to a group specified by the consortium (including the Commission Services)	<input type="checkbox"/>
CO Confidential, only for members of the consortium (including the Commission Services)	<input type="checkbox"/>



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1. Summary

The aim is to evaluate the consumer behaviour facing the reformulated products with a lower content in sodium, fat and sugar in real-life condition. The consumers (144) were asked to rate their appreciation then their willingness to pay for the reformulates and non-reformulated products at home. Then, in a lab session, they were asked to rank for each food category the pleasantness of reformulated food, unformulated one and commercial foods. In most of the cases, the reformulated products were at least as appreciated as the non-reformulated products and the consumers were willing to pay at least the same price as the non-reformulated products. Moreover, in most of the cases, the reformulated and non-reformulated foods developed in TeRiFiQ are at least as appreciated as the equivalent commercial products.

2. Introduction or Background

2.1 Background

As final stage of this demonstration WP, the remaining task was to evaluate whether the reformulated products can be promoted by consumers. Thus this task aims to evaluate the product acceptance and the consumer behaviour facing these reformulated products, in other words, if the reformulated products can be attractive for consumers.

Most of sensory studies aiming to evaluate product appreciation and acceptance take place in lab denying the psychological influence of tasting food products in a very artificial environment. Furthermore, assessing product appreciation by using hedonic scales can often be considered as simply declarative and not consistent real liking of the product leading to a purchase (Ginon, 2010). Therefore, and to be fully in line with the TeRiFiQ project whose objective is to consider these products in “everyday-life”, a focus was put on the ecological, psychological and economical aspect of the products evaluation, including both overall liking evaluation in real-life setting (Meillon et al, 2010) and willingness to pay experiments (Muller and Ruffieux, 2011).

2.2 Approach

To reach the *ecological* aim, the experiments were conducted in the field (at home). For this task, participants received packed-lunches containing reformulated or non-reformulated products. They were first instructed to rate traditionally the pleasantness of the samples. Then, to reach the *psychological* aim, an innovating willingness to pay (WTP) procedure was developed. In short, participants have to indicate the maximal price they are willing to pay for each product knowing that according to this price they may buy the product. Finally, to have an overview of the products positioning facing other products of the French market, and therefore to fill the *economic* aim, a sorting task on pleasantness was conducted.

The overall aim of this deliverable is to evaluate the product acceptance and the consumer behavior facing these reformulated products.

3. Experimentals

The panel contained 144 consumers (female 58%) recruited from our database “PanelSens”.



Each subject was given two packed lunches with two weeks intervals containing the five tested foods: a pack of chorizo (Boadas), a pack of mini-fuets (Boadas), a pack of knacks (cooked sausages, Leiv Vidar), a slice of semi hard cheese (Trappist, Orval) and two muffins (Millba).

One series of packed lunches was prepared with reformulated foods developed at the industrial scale in this WP6 by SMEs and another series of packed-lunch was prepared with the corresponding non-reformulated foods. However, the packaging was the same for the reformulated and non-reformulated products (resembling to a commercial product). Thus, the consumers were not able to distinguish if they received a reformulated or non-reformulated packed lunch.

The consumers were convened to get a **1st packed-lunch** and to bring it at home. Half the consumers received the non-reformulated packed-lunch at first and the other half received the reformulated packed-lunch (balanced order), but they were not aware of the nature of their packed-lunch (reformulated or not).

The consumers were instructed to taste these products in normal conditions of degustation (at home) and to rate pleasantness on a linear scale (from 0: "I do not like at all" to 10: "I like it very much") before assessing the price they are willing to pay. The real price was then revealed to the consumers using a system of scratch-card. They were then instructed to re-evaluate the price regarding the revealed price.

Two weeks later the consumers were again convened to get a **2nd packed-lunch** containing non-reformulated products (or reformulated) depending on the nature of the 1st packed-lunch they received, and repeated the procedure.

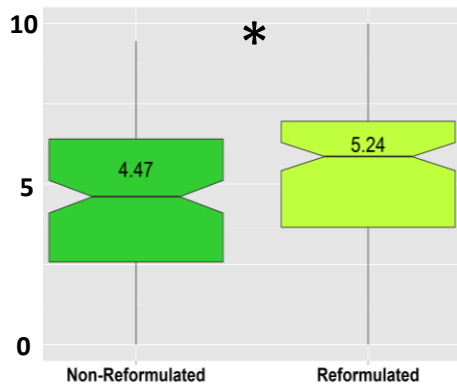
Finally, in a last session (**sorting session**) carried out in the laboratory, all the consumers were asked to rank for each food category the pleasantness of: the reformulated food, the non-reformulated one, a corresponding trademark brand and store brand. It aimed to directly confront formulated and non-reformulated products but also to confront other equivalent products of the market. For each category, the products ranked 1st, 2nd, 3rd and 4th were affected by 4, 3, 2 and 1 points, respectively, used to calculate the mean rank scores.

The different experimental steps are summarized in Figure 1.

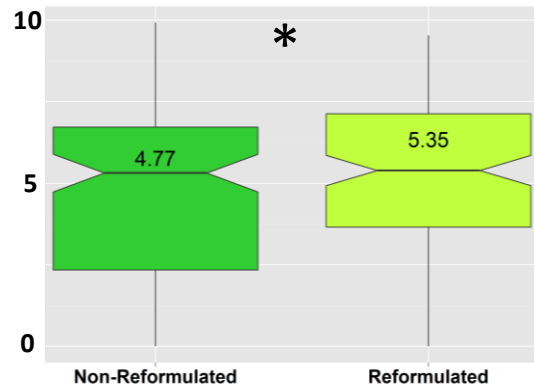
Data analyses were performed using the R software (release 3.1.3). Data of pleasantness and willingness to pay were subjected to analyses of variance (ANOVA) using linear mixed-effects models with participants as random factor. The fixed effects tested were the packed-lunch (i.e. reformulated vs non-reformulated), the order of packed-lunch presentation (i.e. reformulated products at first or not). We also tested the influence of other factors supposed to influence the results such as age, sex and monthly incomes of participants. Further information regarding consuming habits and eating behaviours were implemented in the model.



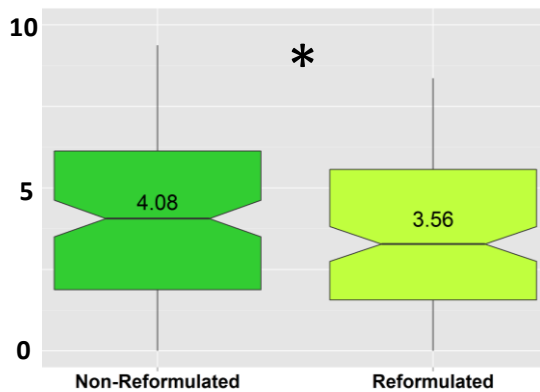
Chorizo



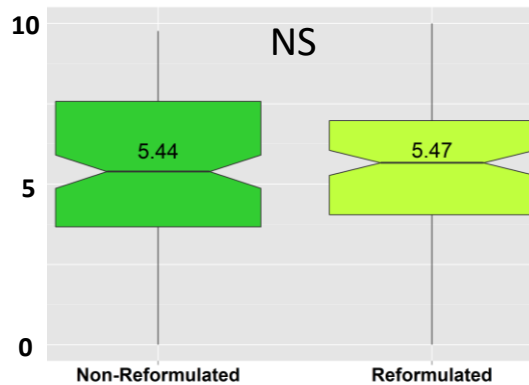
Dry sausages



Cooked sausages (knack)



Muffins



Trappist cheese

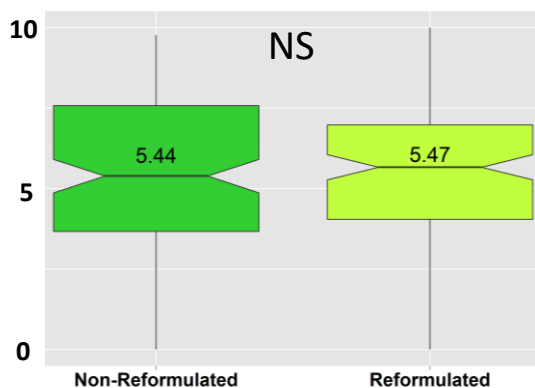


Figure 2. Acceptability of the reformulated and non-reformulated products (*: $P < 0.05$). (linear scale from “0: I do not like at all” to “10: I like it very much”).

Among the tested products (semi-hard cheese (Trappist), chorizo, dry sausage, cooked sausage, muffin), the reformulated chorizo and dry sausages were significantly more appreciated than the initial products. For the semi hard cheese and muffins, no difference

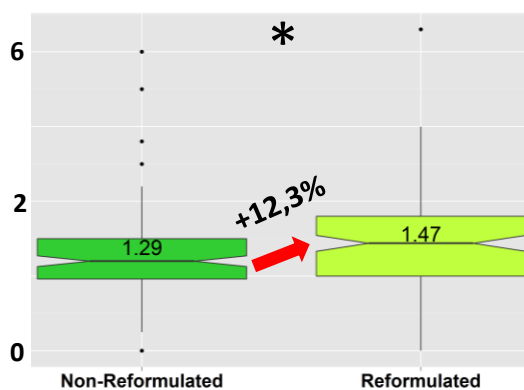
in appreciation was found between the reformulated and non-reformulated ones. Only the reformulated cooked sausages were considered as less appreciated than the non-reformulated ones. In sum for 4 out of 5 products reformulated in the TeRiFiQ project, reformulation maintained consumer appreciation and for two of them reformulation not only maintained but improved the pleasantness.

4.1.2 Willingness to pay

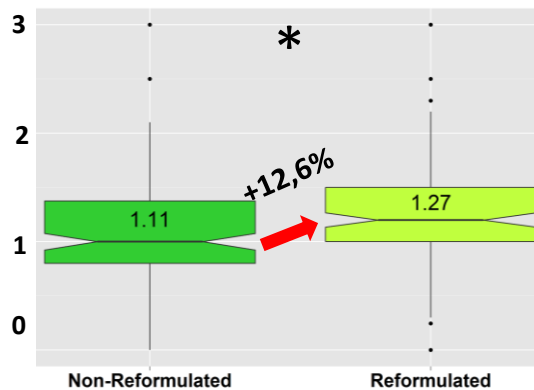
The second objective is to know if the pleasantness evaluation may convey a real interest of the consumer for this product. In other words, if he would be willing to pay more for a product he considered as more pleasant. In that sense, WTP paradigm may inform both on product pleasantness but also on the real interest of subjects to buy the product. Vicariously, the procedure also informs about the affordability of the reformulated products.

The obtained results of willingness to pay toward the products before knowing their real price are presented in Figure 3.

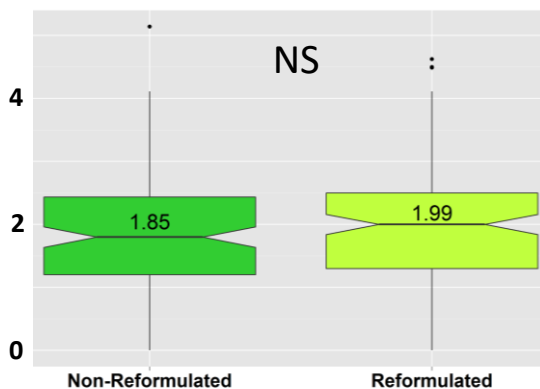
Chorizo



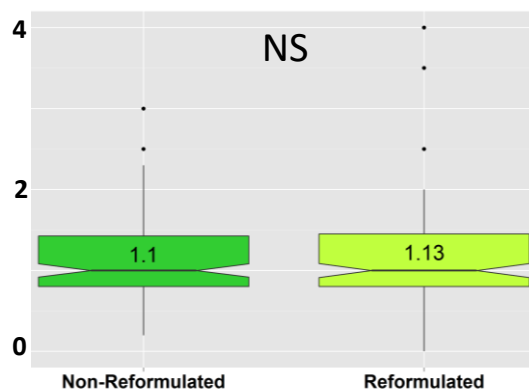
Dry sausages



Cooked sausages (knack)



Muffins



Trappist cheese

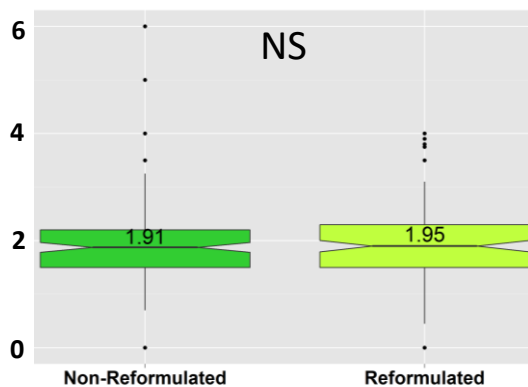


Figure 3. Willingness to pay (in €) for the reformulated and the non-reformulated products (*: $P < 0.05$).

Among the tested products (semi-hard cheese, chorizo, dry sausage, cooked sausage, muffin), the willingness to pay were higher for the reformulated chorizo and dry sausages than for the non-reformulated ones. For the semi hard cheese, cooked sausages and muffins, no difference was found between the reformulated and non-reformulated ones.

In all the cases, we found a rather good and positive correlation between appreciation of the products by the consumers and the maximal price they are willing to pay for these products. The higher the liking, the higher the willingness to pay. This result has different outcomes. It first means that the original field evaluation of willingness to pay developed here is powerful and lead to consistent results compared to in-lab evaluations. The procedure has the great advantage to keep participants in the most natural conditions and their rating is supposed to be consistent with everyday rating of food products. Second, we also showed that using willingness to pay considerably reduces standard deviation than for hedonic. It is even truer for the re-evaluated price (i.e. after revealing the real price of the products hidden behind the scratch-card). Thus the willingness to pay procedure refined the pleasantness score and gave an economic feedback to SMEs regarding buying decisions of their consumers.

We also noticed marginal effects of participants' characteristics on their scores especially regarding age and incomes.

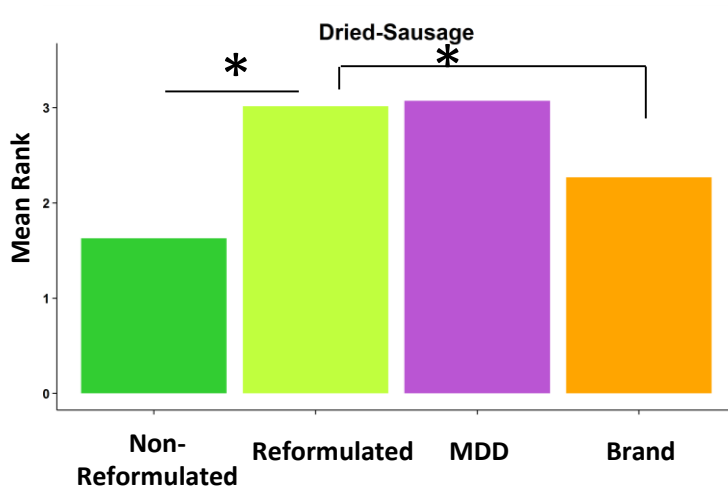
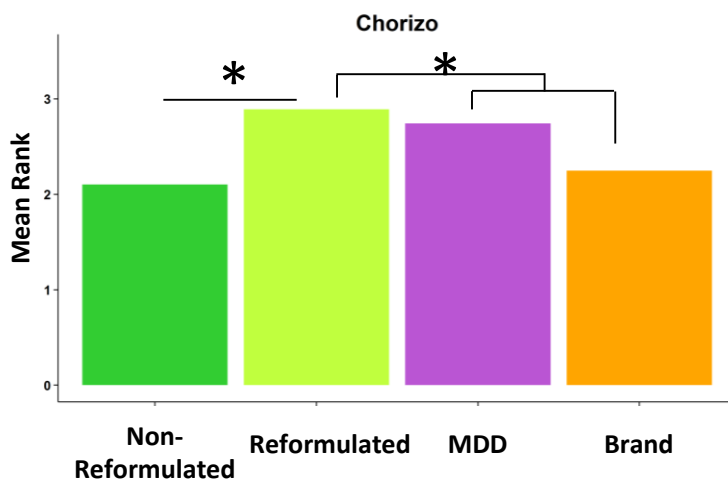
For the chorizo, we observed a significant correlation between the willingness to pay and the age of the consumers. The older the consumers, the lower their willingness to pay. This can be explained by lower incomes or by a low consumption and familiarity for this product. For Trappist cheese, we observed a significant correlation between the willingness to pay of the consumers and their monthly income. The higher their monthly income, the higher their willingness to pay.

We have compared the willingness to pay before and after the consumers know the real price of the food they eat. Though they try to adjust their willingness to pay to the real price, the differences observed between the reformulated and non-reformulated products are maintained for the Trappist cheese, chorizo, dry sausages and muffins. Only for the cooked sausages, the willingness to pay after knowing their real price increased significantly for the reformulated product compared to the non-reformulated one while the appreciation of the reformulated product remained low.

Concerning the muffins, it is noteworthy that we observed a significant negative correlation between the liking of the muffins and the age of the consumers. Other results tend to show that muffins are more frequently consumed by younger participant. Therefore, the correlation is supposed to be explained at least by the familiarity and consumption habits of the subjects.

4.2 Comparison with commercial products

The results of the preference comparison tests between the reformulated foods, the non-reformulated and commercial equivalent products are presented in Figure 4.



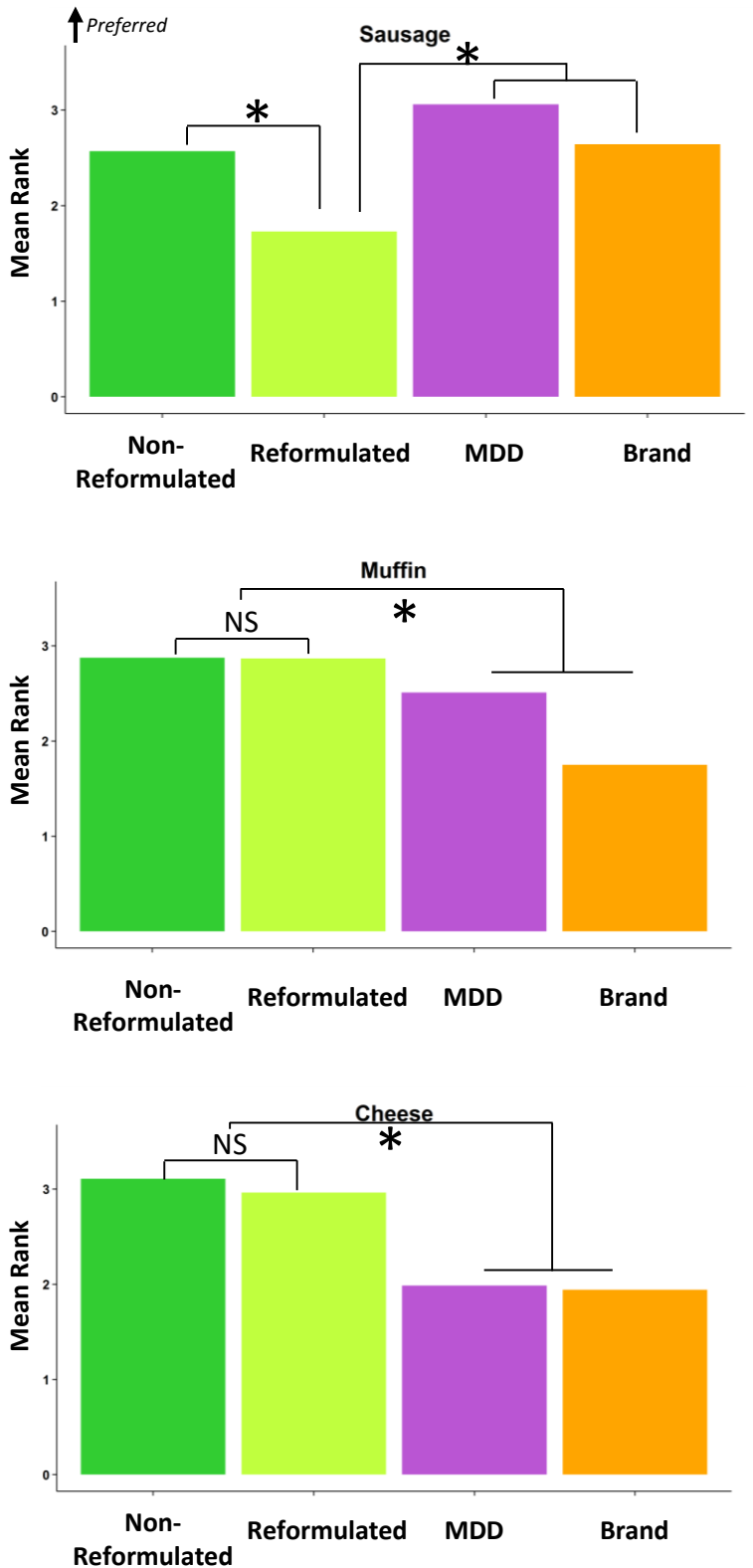


Figure 4. Comparison between reformulated, non-reformulated and commercial products on the basis of their preference by the consumers (*: P<0.05). The higher the “mean rank” score (y axis) the higher the preference.

(MDD = Store brand; Brand = Trademark brand)

Concerning the sorting task, there was no difference between the reformulated and non-reformulated semi hard cheese and muffin. Moreover, they were ranked with a higher value than the commercial similar products. The reformulated chorizo and dry sausages were ranked with a higher value than the non-reformulated and with the same value as the store brand. The reformulated cooked sausages were ranked with a lower value than the non-reformulated, the store and the trademark brands.

Surprisingly, in most of the cases, the trademark brand had the tendency to be ranked with a lower value than the store brand. The trademark brand was never ranked with a higher value than the store brand. Most importantly, for all products (knack cooked sausages excluded), the reformulated versions seem to be serious competitors on the market since they were at least as appreciated as other famous products of the French market and sometimes significantly preferred.

5. Conclusions

In conclusion, in most of the cases, the reformulated products were more appreciated than the non-reformulated products and the consumers are willing to pay at least the same price as the non-reformulated products. For the most appreciated products, the consumers are ready to pay about 12% more for the more appreciated product (reformulated). In other words, they are willing to pay for what they feel as “quality”. This economic margin can be used by the industry for eventual additional costs due to the reformulation process. In most of the cases, the reformulated and non-reformulated foods developed in TeRiFiQ are at least as appreciated as the equivalent commercial products. Regarding the aim of the TeRiFiQ project, the results of WP6.5 showed that it is possible to achieve significant reduction of fat salt and sugar in everyday life food while (at least) maintaining consumer appreciation and purchase. Thus, on this basis, most of the reformulated products developed in the project could already be commercialized.

6. References

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