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LCA METHODOLOGY FROM ANALYSIS TO ACTIONS: EXAMPLES OF BARILLA'S IMPROVEMENT PROJECTS

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ABSTRACT

The life cycle approach is implemented by Barilla in the decision making process to identify processes requiring improvement in order to meet in-line sustainable business strategies. This work illustrated the main improvement projects that Barilla performed in its analyses of Life Cycle Assessment results relevant to dry durum wheat semolina pasta. Projects were undertaken for each phase, including in system boundaries (dry durum wheat pasta, milling, pasta production, packaging production, product transport and household cooking). Results obtained from each phase shall be used to improve processes management along the product chain. An example of improvement action concerns the updating of crop guidelines in relevance to the need of greater sustainability of durum wheat cultivation.

INTRODUCTION

Barilla's development policy strongly pursues the research of business strategy closely linked to sustainability, measuring continual improvements in the areas of environmental footprinting, energy efficiency and water management by means of Key Performance Indicators (KPI).

Environmental related issues are examined through Life Cycle Assessment (LCA) methodology to evaluate each activity along the product chain.

These analyses have two aims: on one hand the identification of hot spots along the product chain with consequential improvement projects, on the other hand the integration of communication policies with reliable environmental information.

MATERIALS AND/OR METHODS

One of the first analyses performed by Barilla focused on the evaluation of durum wheat pasta (see Figure 1); and delved deeply into every phase of the entire chain (durum wheat

cultivation, milling, pasta production, packaging production, product transport and household cooking).

A specific analysis was launched for each phase to identify actions able to improve activity management along the chain.

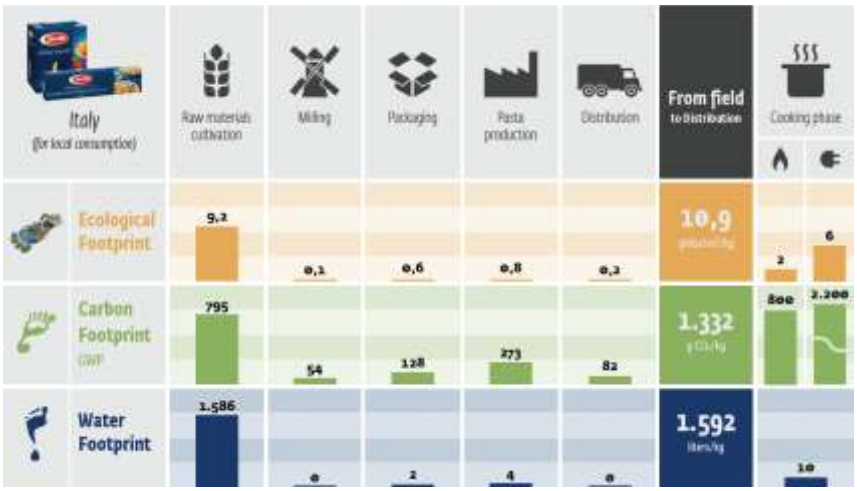

Fig.1: Ecological, carbon and water footprint of 1 kg of dry durum wheat semolina pasta, produced and distributed in Italy

RESULTS

Durum wheat cultivation is one of the phases that most contributes to pasta environmental performances. As a result, Barilla has launched a specific project for the implementation of more sustainable cropping systems for the production of the most important raw material in pats production: durum wheat. The aim was to analyse and compare different cropping systems for durum wheat cultivation. The study demonstrates that “sustainability” is a feasible concept that finds solid application in the agricultural sector: the best durum wheat crop systems identified demonstrate that agronomic improvements (a favourable crop rotation, the right choice of seeding rate and date, an efficient utilization of fertilizers and pesticides) can lead to environmental improvements and an increase in a farmers' income.

The milling and pasta production phases lend minor contributions to environmental performance when compared to durum wheat cultivation. Despite this fact, a series of energy saving projects have been performed (electronic control system for the boilers, installation of Oil Free variable rate compressor, the partial replacement with high efficiency motors).

Aside from the projects mentioned above, two of the three Italian pasta plants have adopted cogeneration/trigeneration power generation. Pedrignano cogeneration plant began full-capacity operation in February 2009; and construction of the trigeneration plant in the Caserta factory was completed in July 2009. The cogeneration plant gave rise to a 13% reduction compared to 2008 in GWP emissions per unit of finished product at the Pedrignano factory.

Environmental performance of packaging production does not have a strong impact along the whole pasta chain. Regardless of this fact, the LCA approach was also applied to packaging materials in order to first check their environmental performance and then compare

alternatives on an equi-functional basis. According to the huge amount of information available over years, Barilla's focus shifted from ex-post analyses to further focus on a dynamic approach which allowed preliminary comparison of packaging alternatives. The general concept revolved around the availability of a restricted set of LCA indicators for each material and process at issue in order to preliminarily pinpoint the environmental benefits of innovative solutions, which will later be fully illustrated through specific data collection and LCA. Results are based on a cradle-to-gate approach; and comparison is made in relation to the quantity of material necessary for 1 kg of packaged pasta. System boundaries account for: primary packaging material production, tertiary packaging material production, shaping process for tertiary material and ancillary materials. In pursuit of the goal, a first LCA calculation tool was developed in 2004 and then refined and enhanced with more specific data as it became available (continuously collected). Packaging materials data is available with a set of predefined processes for shaping and coupling in order to best define the current system, which also includes supply transport. A specific feature also allows an ad hoc analysis of the benefits related to more efficient storage procedures on board delivery vehicles.

A project was also launched to evaluate the environmental performances of the logistic network. Its goals were to identify and analyse a series of Key Performance Indicators (KPI) related to transport activities and to warehouse used for the product storage before its transport to final customer to evaluate logistic improvement projects performed from 2006 to now from an environmental point of view.

Results coming from the project are summarized hereby:

1. Transport emissions have decreased since 2008 thanks to the annual replacement of old vehicles;
2. Emissions per kilogram of product transported have decreased since 2008 thanks to an increase in transport efficiency (e.g. optimization of vehicle saturation);
3. Projects for the improvement of the logistic network have contributed to reduce emissions of carbon dioxide equivalent; an example of such project implemented for a specific route has saved 800 tons of carbon dioxide equivalent.

Household cooking phase also contributes to environmental performances. This fact has prompted Barilla to carry out a project aimed at reducing the amount of water required to cook pasta, while keeping quality standards untouched. LCA indicator monitored in this type of projects is carbon dioxide equivalent emissions (Global Warming Potential - GWP_{100}).

Main hypotheses considered are listed below:

- household cooking could adopt gas or electrical ranges; in the case of power, the GWP varies per country producing site-specific results (see figure 2);
- quantity of water recommended per 100 grams of pasta: 1 litre;
- evaluation of necessary energy is made independent from energy required to heat a specific pot.

Preliminary results (figure 2) reveal that using less water prevents a certain quantity of carbon dioxide equivalent; for example, using 0.5 litres of water (instead of 1 litre) per 100 grams of pasta prevents about 30 grams of carbon dioxide equivalent

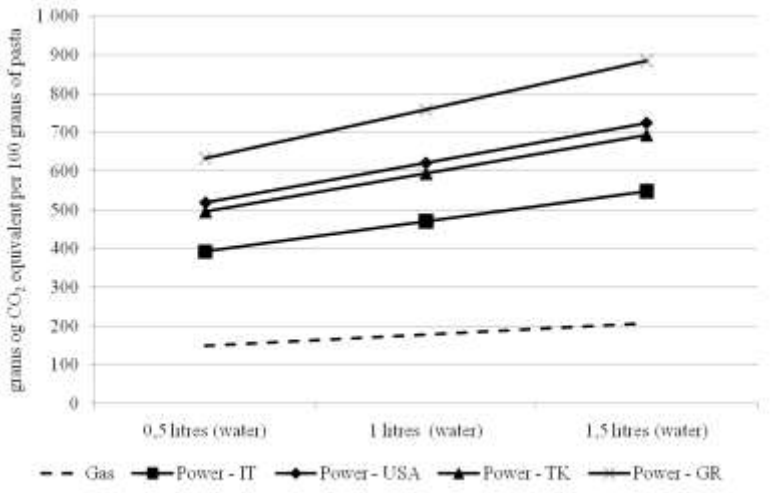

Fig.2: GWP_{100} of 100 grams of pasta cooked at home with different quantities of water (0.5 - 1 - 1.5 litres) using different types of energy mix

CONCLUSION

In its definition of improvement programs, Barilla also accounts for results of LCA evaluation. The company aims to improve both process management and environmental performances of the whole chain. The next update of the crop guidelines, suggested by Barilla, shall also implement the qualitative results of the cropping system project, given that these findings should be tested and confirmed through in-field experimentations. Cogeneration plants and energy saving projects allow Barilla to improve its environmental performance and cut expenses. The use of a calculation tool to determine the environmental performances of packaging materials permits the preliminary identification of environmental benefits linked to innovative solutions, which shall undergo extensive analysis for future implementation. The project concerning product transport will help optimize the logistic network through the use of specific KPI. Lastly, the household cooking phase is not directly controlled by Barilla, rather it depends on consumer behaviour. Barilla could provide cooking recommendations that exploit project results through informative campaigns.

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