



LIFE Project Number

LIFE15 ENV/GR/000257

2nd Progress Report¹

Covering the project activities from 01/02/2019² to 31/07/2020

Reporting Date³

31/07/2020

LIFE PROJECT NAME or Acronym

LIFE-F4F

Data Project

Project location:	Heraklion, Crete
Project start date:	01/09/2016
Project end date:	28/02/2020 Extension date: 28/02/2021
Total budget:	€ 2,580,619
EU contribution:	€ 1,459,227
(%) of eligible costs:	60%

Data Beneficiary

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¹ Progress Report without any payment request (for Progress Reports with payment request, use the Mid-term Report template)

² Project start date in the case of the first Progress Report, otherwise date since the last reporting period

³ Include the reporting date as foreseen in Form C2 of Annex II of the Grant Agreement or as modified in agreement with EASME

Section 1 - Overall assessment of the achievements and as to whether the project objectives and work plan are still viable

This is the second progress report of the LIFE-F4F project, covering the period between February 2019 till July 2020. During this period, the 2nd operational period of the project concluded (May 2019 – October 2019) and all actions are being carried out as foreseen. The optimum, full scale operational period, which is the last operational period of the project started on June, 2020 and it is estimated to be concluded in November, latest December 2020. The duration of this period depends on the level of achievement of some indicators' targets. For this period, due to concerns around the COVID-19, and in accordance with the health guidance from the Greek National Public Health Organization, World Health Organization, and other health authorities, strict measures have been taken all over the world. Within these difficult circumstances that occurred, and as it was not clear how the touristic period in Greece will evolve, partners after approval by the EC, were allowed to use alternative raw materials, such as vegetable waste from supermarkets in combination with the collected food waste from the cooperating hotels, so as the project to achieve mainly the quantitative indicators targets. In parallel, during this period partners will carry out experiments with hotels' food waste and hotels' food waste without animal by-products, something which had already been requested by partners from AUA and FUB the previous period. Up to now the project is ongoing as foreseen.

Environment & Resource Efficiency: The Solar drying/ pasteurisation Pilot Unit has successfully and consistently been operated at the set periods, between May 2018 and October 2019. In total, two hundred and thirty-six metric tonnes (**235.9**) of hotels' food residues have been diverted from landfill up to now, producing sixty-five (**65**) metric tonnes of dry animal feed, resulting in the avoidance of **591** metric tonnes of CO_{2eq}. The GHG emissions of the F4F solar dry-based treatment were estimated to be **192 kg CO_{2eq}** per tonne of food waste. Preliminary results of the analysis comparing the environmental footprint of the F4F solar dry-based treatment against the production of animal feed with conventional drying methods indicate that the GHG **savings** were **95 kg CO_{2eq}** per tonne food waste or **0.65 kg CO_{2eq}** per kg of produced feed. A reduction of all microbiological hygiene indicators was observed on the dried product of the F4F solar dry-based treatment that satisfies in general the minimum safety criteria for foodstuffs. The absence, in all analysed samples, of *Salmonella spp.*, *Campylobacter spp.* and *Listeria monocytogenes* abide by the Regulation (EC) 2073/2005, averting the most important concern on feeding wasted food to farmed animals (Table 1).

Table 1. Average values of the determined microbiological parameters in each operational period^(a)
Operational period

Parameter	Units	2018		2019	
		Food waste	Dried product	Food waste	Dried product
Total Coliforms	CFU/g dw	7.20E+06 (3.84E+06)	2.09E+04 (6.34E+02)	5.31E+06 (2.62E+06)	ND ^(b)
<i>E. Coli</i>	CFU/g dw	1.78E+05 (1.50E+05)	3.29E+02 (1.10E+02)	7.50E+05 (3.79E+05)	ND
<i>Salmonella spp.</i>	MPN/100ml	ND			
<i>Clostridium perfringens</i>	CFU/g dw	3.10E+04 (2.06E+04)	ND	1.73E+03 (7.84E+02)	1.07E+03 (8.91E+01)
<i>Staphylococcus aureus</i>	CFU/g dw	1.47E+05 (9.73E+04)	ND	5.21E+04 (3.89E+04)	5.18E+02 (8.91E+01)
Yeast	CFU/g dw	2.00E+07 (1.07E+07)	3.55E+04 (1.60E+03)	1.30E+07 (6.21E+06)	6.83E+03 (0.00E+00)
<i>Listeria spp.</i>	CFU/g dw	ND	8.42E+02 (9.68E+01)	1.07E+06 (8.44E+05)	1.26E+04 (9.48E+03)
<i>Listeria monocytogenes</i>	CFU/g dw	ND			
<i>Campylobacter spp.</i>	CFU/g dw	ND			

(a) The values in parentheses are the standard error of the mean (SME). (b) ND: not detected.

Overall, the solar dry-based treatment is proving effective. The monitoring of the microbiological parameters will continue for the third operational period June-November 2020.

Converting food waste into animal feed is also a sustainable practice compared to the environmental and health impacts of different technologies for food waste processing, including anaerobic digestion and composting. The feed production from food waste based on the F4F solar dry-based treatment has the lowest impact and is thus capable of providing environmental and public health benefits at a societal level.

Concerning replication efforts, in 2019 a proposal submitted by HMU and the hypermarket chain of Chalkiadakis SA to the General Secretariat for research and technology has been approved and accepted for funding. This project was about €1.5 million and the main purpose of this was a construction of a full-scale unit (a pre-treatment and solar drying unit) for the utilisation of green and food waste to produce animal feed. However, as Chalkiadakis SA was a large company, the funding rate was 25% and due to this low rate finally the project was not realised. Beyond this project with Chalkiadakis, for the replication of the F4F project there are also other companies (Medical Waste) which is also interesting for a full scale unit for the production of animal feed. Partners, up to the project's conclusion will try their best so as to promote the replicability actions.

The results of the project (e.g. regarding food hygiene or food tolerance by the animals) could contribute to changes of the European legislation. Nevertheless, due to the intended change in the collection of food waste in the second operation phase (collection of food waste from supermarkets), this procedure could substantially contribute to the achievement of the project objectives. Plant-based material does not fall within the scope of the regulations for “animal by-products” (Regulation (EC) No. 1069/2009), so the collection of specific food waste (only plant-based) is an excellent option to use food waste for animal nutrition without legal limitations. The dried food residues of the second operation phase will be analysed, and further animal trials with dogs and cats could be considered. Overall, the project objective to use food waste in animal nutrition to reduce the environmental burden is still viable and currently pursued with an optimised collection procedure. The foreseen procedure will improve the potential of pet food including food waste to become marketable.

We see an urgent need to discuss the results of these investigations and the prospects they offer for pet food on a political level and to involve companies working in this field. The environmental impact of pet food production is great and is increasingly being discussed critically. The recycling of by-products is an excellent option to reduce the environmental impact. It should also be discussed if the characterisation of food produced in hotels could be changed in the future, as this is fresh and fully usable food and mainly not catering waste *sensu strictu*. The indirect impacts of the project could be the use of many other lefts or by-products from supermarkets, food markets, agroindustry, etc. which are not edible or marketable.

Policy implications: The F4F project aimed to evaluate the feasibility of an innovative process for feed production in the European Union (EU) and to identify the best strategies to implement them. EU guidelines state that food waste should preferentially be used as animal feed though for most food waste (i.e. catering waste) this practice is currently illegal (except for fur animals), because of disease control concerns. Interest in the potential diversion of food waste for animal feed is, however, growing, with several East Asian states offering working examples of safe food waste recycling

The continued use of food waste is permitted only where it can be demonstrated that there is no risk of contamination with meat, fish, or other animal products. This requires either that a facility handle no animal products, or they establish completely separate handling streams for animal and non-animal products, along with Hazard Analysis and Critical Control Point (HACCP) procedures, which are practiced with rigour by the 5 and 4-star hotels in Crete (Greece). Given this potential already demonstrated by the F4F process, the reuse of food for feed purposes needs to be more extensively explored and evaluated. The use of (former) foodstuffs and by-products for feed production are hardly implemented in the EU due to the current legal framework on food waste management and livestock feeding. The possible need for modifying and adapting EU legislation and policy so that processes as the F4F or of similar competent use of food waste to be incorporated in resource efficiency concept, is being addressed and the interventions on the EU legislation are identified and formulated. Meetings with representatives of the Ministry of Environment and Energy and the European Commission are being organised for September and October to advance the proposed policy and consequently legal changes.

Section 2 - Identified deviations, problems and corrective actions taken in the period

The project's technical implementation has been progressing well so far and does not confront significant delays, while obstacles and some delays have been observed in dissemination activities, as partners have to organize and to participate in dissemination events, open days, conferences, etc. Further obstacles are expected in these activities with the anticipated 2nd wave of coronavirus. So, as it is not clear yet how this situation will develop, an additional extension (of about 3-6 months) of the project may be required in order for these actions to be better supported by partners.

The following deliverables have not been completed as foreseen and face some delays:

Action B6 – Deliverable. Technical manuals and designs of a full-scale unit. This deliverable was to be concluded in August 2020. However, there was a delay during the relevant tender preparation by the personnel of the educational and research committee (HMU) due to the covid-19. It is now anticipated that this tender will be concluded up to October 2020.

Action B6 – Deliverable. Operational manuals of a full-scale unit. This was to be delivered up to 12/2020. The relevant manuals will be delivered up to the end of the project, taking into consideration data from the conclusion of the third operational period.

Action B6 – Deliverable. Business plan of a full-scale unit. This was to be delivered up to 08/2020. The concluded BPLAN will be delivered up to the end of the project, taking into consideration data from the conclusion of the third operational period.

However, up to now there are no significant deviations from the KPI's targets, and no main deviations are expected. The same could be mentioned also for the main project's progress, as it seems that the project can stay within schedule and no main deviations, problems or corrective actions have been occurred, except the delays in dissemination actions. This must be clarified as soon as possible, as it seems that an extra extension might be needed so as this action to be fully completed. Partners estimate to have a better understanding of the covid-19 impact during September.