EUROPEAN COMMISSION
RESEARCH EXECUTIVE AGENCY

FP7 SME Actions

Brussels, 21/12/2016
REA.B2 [redacted]

REGISTERED E-MAIL

TEAGASC - AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY
[redacted]

Subject: **Final payment information letter**
Reporting Period Nr 2 from 01/04/2014 to 31/12/2015
Grant Agreement FP7-SME-2012-314879-AUTOGRASSMILK

Dear [redacted]

The Research Executive Agency (REA) has approved the periodic report, the final report and the financial statements submitted by you. We confirm that they are in accordance with the provisions of the grant agreement.

You will find in annex:

- the assessment report including, where appropriate, recommendations and comments.

The total accepted EU financial contribution amounts to EUR 1.582.590,67

The payment results from the reimbursement of the eligible costs submitted and accepted without prejudice to Articles II.22 and II. 23 of the grant agreement.

We are pleased to inform you that we have started the procedure for transferring the amount of EUR 227.354,60 to the bank account indicated in Article 5.3 of the grant agreement. The reimbursement from the Guarantee Fund (EUR 113.677,30) will be transferred separately with another payment.

This final payment completes the reimbursement of eligible costs under the grant agreement. According to Articles II.22 and II.23 of the grant agreement, the REA or the Commission may, up to five years after the end of the project, arrange for financial and technical audits or reviews to be carried out, by external auditors, or by the REA or by the Commission services themselves including OLAF.

Agence exécutive pour la recherche / Uitvoerend Agentschap Onderzoek, B-1049 Bruxelles / Brussel - Belgium.
Office: COV2 – COV2 17/030. Telephone. direct line (32-2) 2956191. Fax: (32-2) 2979650.

E-mail [redacted]

Should you have any objections with regard to this payment, you have two months from the date of receipt of this information to give reasons in writing to the REA. After the end of this period such requests will no longer be considered and you are deemed to have accepted the REA's decision.

I remind you about your obligation of Article II.4.3 of the grant agreement to submit a report on the distribution of the EU financial contribution between beneficiaries within **30 days after receipt of the final payment**, including the amount reimbursed from the guarantee fund.

Please inform the other beneficiaries about the results of the assessment for this last reporting period and proceed with all appropriate payments to them without unjustified delay, as indicated in Article II.2.3 of the grant agreement.

Yours sincerely,

Head of Unit

Enclosures: Assessment report

EUROPEAN COMMISSION
Research Executive Agency
SME Actions

Project No: 314879

Project Acronym: AUTOGRASSMILK

Project Full Name: Innovative and sustainable systems combining automatic milking and precision grazing

Research for the benefit of SMEs

Assessment Report

Period covered: from 01/04/2014 to 31/12/2015

Date of preparation: 05/12/2016

Start date of project: 01/01/2013

Duration: 36

Project coordinator name:

Project coordinator organisation name: TEAGASC - AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

Date of Review Meeting:

Name of Expert(s):

Name of Project Officer:

Version: 2

Assessment Report performed by Project Officer

1. Overall Assessment

a. Executive summary: Comments, in particular highlighting the scientific/technical achievements of the project, its contribution to the State of the Art and its impact.

AUTOGRASSMILK aims to contribute to sustainable dairy farming systems by optimising integrated grazing with Automatic Milking (AM). It involves six countries with significant impact on dariy farming in the EU: Ireland, Netherland, Denmark, France, Sweden, and Belgium. The project is structured on a wholistic approach and its results have good potential of implementation all across the Europe and contributing to sustainable and economically viable farming.

See below (2b) for detailed information.

b. Overall assessment / Progress.	Project has achieved most of its objectives for the period with relatively minor deviations.

Comments

AUTOGRASSMILK is a vast project considering the number of experimental studies, the parameters researched during the studies, the analysis conducted on these parameters, the farms and cows contributed in the study, etc. It has achieved most of its objectives for the period with relatively minor deviations. As the context of the project is quite wide and variables are too many, some of the parameters could not be addressed but the consortium tried its best and managed to produce a strong research backbone on grazing and automatic milking at the end of the project. The project also paved the way to a potential of further research on the subject and in line with this, new project applications have been filed under H2020.

2. Objectives and Workplan

a. Have the objectives for the period been achieved? In particular has the project as a whole been making satisfactory progress in relation to the description of work (annex I to the Grant agreement).	Yes

Comments

The objectives for the period have been achieved. The project involves many parameters which need to be managed and monitored efficiently together to obtain new information in line with the objectives. Several studies have been undertaken in each WP during the project, and also a master of science thesis has been conducted. In this regard, it's clear that progress made in each WP is coherent with the individual objectives of each one of them and also with the overall project objectives. The project as a whole made satisfactory progress and resulted in significant scientific and technological achievements.

b. Has each work package been making satisfactory progress in relation to the Description of Work (Annex I of the grant agreement)?	Yes

Comments

As a general remark, it can be concluded that each work package has made satisfactory progress despite the difficulties in data collection and varying practices /breeds/behaviour patterns among the

countries. The achievements covered in this reporting period are summarized as follows:
WP1:
Task 1.1 focuses on experiments structured to understand the effect of certain parameters on the milk output.
In Irish study of a 70-cow herd, grass constituted 85% of the cow diet and AM system was used. The final results showed that it is possible to reach milk output results which is as good as those achieved in conventional milking systems. In the second reporting period two different studies in Ireland have been performed. The first one concluded that "management strategies towards the latter stages of lactation would be to reduce milking frequency and increase concentration supplementation in an effort to maintain milk yield and reduce pre-milking waiting time". The second study which aimed to understand the effect of different supplements in different seasons concluded that "there are no adverse effects on cow production or cow traffic with an automated milking system integrated with grazing in Ireland. Therefore, grass management strategies that are implemented with a conventional milking herd can also be implemented with an automated milking system."
In Swedish study it is shown that there was no difference between 10% and 25% of grazed grass in terms of milk yield and solids per cow.
Task 1.2 aims to develop best practice feeding strategies to meet variations in the grass supply. This task also aims to find the optimum proportion of grass in the cow diet.
Different studies have been performed in Sweden, Ireland, Denmark, France and Belgium.
In Ireland, the results showed that milking intervals are significantly longer during a high grass proportion diet comprising of 93% grass than that of low grass proportion diet comprising 75% grass. Further analysis will be needed to prove the effect is reproducible in different times of the year, etc. It was also stated that feeding more concentrate might have had increased milk yield and milk solids, however it is not supported with relevant data and also economic evaluation of this finding would be necessary.
In the study undertaken in 3 different organic farms in Denmark, it is shown that pelleted commercial concentrate gives more promising results over home-grown supplement of rolled or crushed cereals in terms of milk yield and milking frequency. This was attributed to the higher attractivity of pelleted feed than feed given as a meal. In the second period, in Denmark, the feeding strategies of the monitor farms were analyzed during two seasons (2014 and 2015), however large variations have been found out between the monitor farms in terms of fresh grass, self-sufficiency, and the concentrates used. The registrations showed no specific correlations between feeding regime and milk yield. However, there was a correlation (1.3-1.4) between milk yield and kg DM fed. thus implying that the similar milk yields could be obtained by grazing and by indoor feeding, and also by home produced roughage and concentrates, including proteins.
In France, the study has shown that the milk yield is the highest in transition feeding which involves grazed grass together with concentrate and maize silage compared to indoor feeding (no grazed grass) and outdoor feeding (no maize silage). Milk yield obtained in outdoor feeding was the lowest among them which was contributed to the use of lower amount of concentrates in the cow's diet. Another important finding of the study is that the cost of feeding reduced significantly (66%) in outdoor feeding compared to indoor feeding. In the second phase of the project, the experiments conducten in two different places. It is found out that the feeding cost was always lower when cows were grazing. A grazing system with only one paddock and 24 hour grazing was tested but this system proved to be unsatisfactory with regard to cow traffic and milk yield. Later a system where the animals rotated between 2 grazing areas daily (AB system) and a system where the animals rotated between 3 grazing areas (ABC system) have been tested and evaluated. It was concluded that these systems give satisfactory results with regard to cow traffic, milking frequency and milk yield. Yet, since there are too many variables, the decision was left to be determined on commercial farms on a case by case basis. In the other place, many different findings have been obtained, some of which were achieved as an outcome of a master thesis.
In Belgium, it is shown that higher amount of concentrate has a positive effect on milk yield and milking frequency. In the second phase of the project; the trials showed that the response to concentrate offered to grazing cows in a mobile AM system was influenced by the grass quality and availability. The cow traffic to the robot was influenced by concentrate level, with increased returns to the robot associated with high concentrate levels. The milk production was found to be higher in normal temperature periods than that of heat stress periods.
In Sweden, a field study on management during the pasture season was conducted on 20 Swedish farms with at least two automatic milking (AM) units and over 130 cows registered in the official control system. Days in milk and cows per robot were tested in the mo del but were non-significant.

Milk yield was 30.1 and 28.4 kg energy corrected milk in winter and summer season, respectively ($P < 0.001$). A more detailed analysis, using daily production farm data from the AM unit from the months before and after pasture let-out on each farm, showed a significant ($P < 0.05$) decrease in the number of cows milked per robot after pasture let-out (57.5) compared with before (60.1). When number of cows per robot was included in the model together with season, a significantly ($P < 0.01$) higher milking frequency per cow was observed before pasture let-out (2.57) compared with after (2.45).

Task 1.3 aims to find out the effect of cow breed/type on optimisation of grazing with AM systems. Studies have been conducted in Ireland and Sweden. In Irish study, it was suggested that NRx and HF cows were more efficient within the system than the JEx cows when taking cow traffic-ability into consideration. Concentrate and breed had a significant effect on feed intake and milking interval. In Swedish study, a higher milk yield was recorded for the Swedish Holstein breed however, the grazing and outdoor behaviour of cows showed no significant differences between the breeds.

WP2:

Task 2.1 aims to develop a Decision Support Tool (DST) which is capable of mapping, capturing relevant grass measurement parameters (pre-post grazing), and automatically transmitting data to a smart phone via an application. The DST, viz. Grasshopper, has been developed. Its calibration has been optimised according to the results obtained from the preliminary tests. The DST has been attached to an existing commercial product to obtain a hybrid which allows the comparison and validation of the results at first hand. In the second period, the Grasshopper was tested on research farms at Teagasc (Ireland), Institut de l'Elevage (France) and Wageningen UR Livestock Research (The Netherlands) under different conditions (sward types grass and grass clover, different sward heights, stages of sward growth and sward growth period e.g. tillering to finishing of flowering in spring, summer and autumn, different s ward densities pre- and post-grazing). Furthermore, it was applied on the SME end user farm in Ireland. An operation manual of the Grasshopper was also developed. It was concluded that the Grasshopper measures grass height with high precision.

Task 2.2 aims to evaluate technologies to support integration of grazing and AM systems such as technologies that assist farmers in motivating cows to visit AM unit regularly and obtain data from the herd such as cow behaviour. In the 2nd period, during the grazing period (May to September) robot and sensor data were collected on four research and two private farms in the Netherlands, Belgium, Denmark and France over three consecutive years. In general, as access to the pasture became extended, the number of milking per robot and thereby, also the milking frequency decreased. Too long intervals have a negative effect on milk yield, especially when the milk yield level is high. It was concluded that increasing access to pasture resulted in a lower milking frequency and lower milk production per cow. However, it was also suggested that this effect may be influenced by the applied grazing strategy and daily management. It was also concluded that if the proportion of grass in the forage diet decreased, total eating time was lower. Activity data of four farms were used in the development of oestrus detection models with the use of different sensors. It was concluded that oestrus detection models could be developed with a sensitivity of more than 80% and a specificity of more than 96%. For further improving the performance, it is recommended to develop more sophisticated models, by making use of other available data such as cow calendar data (e.g. oestrus and pregnancy dates) and other automatically recorded data (e.g. eating time and milk yield).

Task 2.3 aims to evaluate the potential use of AM-carousel system with grazing. The results showed that supplementary silage decreased outdoor time, gave a tendency for higher milk yield, gave no advantage with regard to cow traffic and is uneconomical when there is pasture available.

Task 2.4 focuses on the potential use of mobile AM systems for fragmented farms. It is concluded that the mobility of a robot is technically possible and adds value to pastures that are distant from the main farm. However, it is not easy to organise and requires a very early phase of planning and reflection by farmers.

WP 3:

In Task 3.1 which aims to identify quantifiable sustainability indicators, key stakeholders have been identified and 28 interviews via phone or face-to-face meetings have been done. In parallel a web-based questionnaire has been developed. A registry of indicators were established and weightings of each indicator were identified in each country to understand country specific sustainability priorities.

Task 3.2 involves registration of Monitor Farms. Data of 36 AMS farms practicing grazing was collected for 2013 and 2014.

Task 3.3 deals with the assessment of sustainability data and Task 3.4 aims to develop a sustainability assessment tool for farmers. Dash-board model has been identified as a suitable template to compare key sustainability performance indicators. Since what is considered sustainable farm performance can vary in each country, country specific reference values were gathered and validated.

WP 4:
In Task 4.1, the economic impact comparisons have been completed on a: per litre of milk produced, per hectare of land farmed, and per farm basis, per country.
In Denmark, farms that grazed their cows had lower costs associated with purchased proteins as a separate feed entity, compared to farms that did not graze. However, it is not known exactly how much protein the mixed concentrates contained. The price of roughage was very important as it was the largest single entity of the feed in the diet. In the top five herds with grazing cows, 50% of the diet consisted of roughage, indicating that roughage was cheaper than concentrates.
The France study confirmed that on the AMS farms, keeping as much grazing as possible for dairy cows results in a lower feeding cost. However, it seems necessary to have fewer cows per AMS box or to change the grassland management of the grazing herds to optimise the management of the grazing periods when the cows are outside grazing and the robot spends more time idle.
In NL, on average, grazing resulted in more efficient operational management and a higher gross operating profit. However, these positive results declined in relation to increasing farm size.
It is also stated that it is difficult to do a more detailed comparison of grazing and non-grazing and difficult to draw final conclusions because the results of the three countries differ a lot in terms of production systems, management, traditions and location. In general, introduction of grazing into feeding systems mainly based on maize silage leads to an interesting decrease in the feeding cost, in particular for the concentrate component. In contrast it leads to higher equipment costs in situations of farms with AMS, possibly because of a lower average saturation level of the AMS boxes on these farms.
In Task 4.2, total dairy labour input was significantly less ($p<0.05$) on AM compared to CM farms. The highest total discounted farm net profit, at both farm sizes, was achieved by the 12MS and 20 MS milking systems.
In Task 4.3, it was found out that the annual profitability was consistently higher where cows were milked less frequently. On average net profit was five times higher in the larger herd size when compared to the smaller herd size even though milking frequency and milk yield was lower. For the discounted cash flow balance, it was calculated that over the ten years evaluated the large herd size generated 6.4 times more net real profit for the business.
In Task 4.4, a document/decision support tool has been designed for farmers that have a combined AM with grazing system, and want to obtain information on this combination. Additionally, two web-based programs are developed and linked into the DST.
An active dissemination and communication strategy has been put into practice under WP5. Project management was also successfully implemented under WP6.

c. Have planned deliverables (and milestones) been achieved for the reporting period?	Yes

Comments

All the milestones and deliverables have been achieved satisfactorily.

d. Are the objectives for the coming period(s) (i) still relevant and (ii) still achievable within the time and resources available to the project?

d.i) still relevant?	Not Applicable
d.ii) still achievable?	Not Applicable

Comments

n/a

e. Have any corrective actions been implemented since the last project review?	Not Applicable

Comments

n/a

3. Resources

a. To the best of your estimate, have resources, i.e. personnel resources and other major cost items, been i) used for achieving the objectives of the project, ii) For real cost categories, in a manner consistent with the principle of economy, efficiency and effectiveness. Please cover both aspects i) and ii) in the comments below.

a.i) To achieve objectives?	Yes
a.ii) For real cost categories – are the resources used in a manner consistent with the principle of economy, efficiency and effectiveness?	Yes

Comments

The resources have been used for achieving the objectives and for real cost categories.The total resources are not overused and stay within the expected budget.

b. If applicable, please comment on large deviations with respect to the planned resources.

n/a

c. When required - are certificates on the financial statements (CFS) submitted?	Yes
d. Are there any rejected costs in the CFS?	No

Comments

4. Implementation of the Project

a. Has the project management been performed as required?	Yes

Comments

The project management is active and has been performed as required.
The tools and implementation methodologies for successful management of the project have been put into practice properly.

b. Has the collaboration between the beneficiaries been effective?	Yes

Comments

AUTOGRASSMILK involves 6 different countries and many different tasks have been performed synchronously in these countries. Luxembourg was also included in the project without remuneration. The results and outputs of the project clearly show that there is good synergy between the partners and they obtained good progress in collaborating each other.

c. Do you identify evidence of underperforming beneficiaries, lack of commitment or change of interest of any beneficiaries?	No

Comments

Each partner was active in the project and made satisfactory contribution.

5. Use and Dissemination of the Foreground

a. Impact: Is there evidence that the project has/will produce significant scientific, technical, commercial, social, or environmental impacts?	Yes

Comments

The project has produced significant impact in many ways. At first hand, the studies that were carried out during the project have revealed many important findings on the factors affecting milk production customised for countries and breeds. The DSTs that was developed within the project has high potential to create significant commercial impact. Firstly, they will assist farmers to optimise grazing implemented together with AM systems which in turn results in a decrease in production and feeding costs. Secondly, DSTs will be highly competitive as final products in the dairy farming market.
The project will also create environmental benefit, as well, by optimising the resources used, fostering sustainable dairy farming and also contributing positively to cows' psychology which in turn result in more milk production.

a.1. Is there an impact on participating Small and Medium Entreprises (SMEs)?	Yes

Comments

The project produced many important findings which can be easily put into practice. The education level and competency of the farms are highly likely to get a boost from the project results and resource usage will also be optimised. A more educated implementation strategy is highly likely to be adapted by the farms and efficiency-effectiveness will increase.

a.2. Is there an exploitation potential for the participating SMEs?	Yes

Comments

The interactive tools seem quite effective and are also user-friendly. Some of the foreground have been started to be used by SMEAGs already. Since the technical parameters such as milking, feeding, and management patterns are studied for each country, the SMEs are highly likely to benefit from exploitation.

b. Is the plan for use and dissemination of the foreground, including any update appropriate? Please comment on this plan for the consortium as a whole, or for individual beneficiaries or groups of beneficiaries and its progress to date.	Yes

Comments

The plan for use of foreground has been explained in detail in Section 8 of Consortium Aggreement. The plan is legitimate, implementable and fair. Equal and joint ownership rights are given to the SME-AG partners. The background is also given in detail in terms of know-how and equipment, which leaves no ambiguity of the ownership and usage of them.

c. Has/Have the beneficiary/ies disseminated project results and information adequately (e.g. publications, conferences, etc.)?	Yes

Comments

The dissemination WP and plan involves many different activities with different target audiences. During the project a very effective dissemination process has been implemented. A web site has been designed and developed. Information on the project has also been given as a link or uploaded to other relevant web sites. Visits have been organized to farms incorporating AM systems. The members have participated to many conferences and fairs organized events (open days, conferences, educational meetings, etc.) relevant to the scope of the project. Publications have also been made in this reporting period.

d. Has there been suitable communication with potential users or stakeholders of the project/research results?	Yes

Comments

The Monitor Farms community have been involved in the project activities successfully.
The project also managed to attract another partner from another country into the consortium on a volunteer basis.

6. Other Issues

a. Have policy- related and or regulatory issues been properly handled?	Not Applicable
b. Have ethical issues been appropriately handled?	Yes
c. Have safety issues been appropriately handled?	Not Applicable

7. Calculation of the next payment

Total requested EU contribution

	Net payment	Requested contribution based on Form C	Of which certified costs (if applicable)	Interests
pre-financing	1364127.60	0.00	0.00	0 00
1st period	681823.98	833129.09	265233.24	239.82
2nd period	227354.60	1582590.67	662220.22	0 00
Total	2273306.18	2415719.76	927453.46	239.82

a. Comments (explain any rejection of costs etc.).

The maximum EU funding contribution established in the Grant Agreement is: 2.273.546 €

The EU Contribution based on Forms C for this period is equal to: 1.582.590,67 €

The net amount to paid to the coordinator related to the second reporting period is equal to 227.354,60 €

Please note that the 5% of the "Guarantee fund" (€113.677,30) is included in the pre-financing of 1.364.127,6 € .

b. Recommendations (e.g. on overall modifications, corrective actions at WP level, or re-tuning the objectives to optimise the impact or keep up with the State of the Art, or for other reasons, likesuch as best use of resources, re-focusing etc.).

N/A

8. Result

Reports approved	Yes
Reject reports and, if appropriate, start the procedure for termination of the grant agreement in whole or in part	No
Partial approval leading to reduced payment (see explanations under "comments" or "recommendations"	No

9. Flag the Project - Not related to the 'certified as correct'

Flag(s) for the project	No
Comments	

10. Extraction to other systems - Not related to the 'certified as correct'

I declare that I have reviewed the publishable summary, the project web site address and the related attached documents submitted by the Project Co-ordinator / mono beneficiaries and I find them suitable for publication, i.e. on CORDIS, etc ... No information marked as "confidential" has been found neither in the publishable summary nor in the other attached documents.

I am aware that the electronic version of the project assessment submitted via this IT application is the valid version substantiating the 'certified as correct'. This electronic document will be filed and registered automatically.

Attachments

Name of the PO:

Date

This declaration was visaed electronically by [redacted] (ECAS user name [redacted]) on 05/12/2016