FEED-A-GENE

Adapting feed, animals and feeding techniques for more efficient and sustainable monogastric livestock production systems

Deliverable D7.6

4th annual newsletter and minutes of the two demonstration events and of the stakeholder meeting organised during the 4th year of the project.

Due date of deliverable: M52

Actual submission date: M52

Start date of the project: March 1st, 2015 **Duration:** 60 months

Organisation name of lead contractor: AFZ

Revision: V1

Dissemination level	
Public – PU	**X**
Confidential, only for members of the consortium (including Commission Services) – CO	
Classified, as referred to in Commission Decision 2001/844/EC - Cl	

Table of contents

1 Summary

This deliverable includes the 4th Annual newsletter and the minutes of the two demonstration events and of the stakeholder meeting organised during the 4th year of the project. The annual Feed-a-Gene newsletter aims at informing stakeholders and consortium partners about recent, on-going and planned events and activities, and about the progress made since the last meeting in April 2018. Progress reports were communicated by Work Package researchers during and after the 4th Feed-a-Gene annual meeting held in Budapest in May 2019. The newsletter was disseminated by email to 431 stakeholders and is available as a PDF file on the website. The minutes of the meetings were recorded and edited by AFZ.

2 Newsletter

2.1 Introduction

The impact of the Feed-a-Gene project is heavily dependent on the ability of its partners to disseminate information to stakeholders during all the phases of the project. The dissemination plan includes the publication of five annual newsletters. The objective of this fourth newsletter is 1) to present recent, on-going and planned events activities related to Feed-a-Gene, 2) provide updates on the progress made in the project since the last annual meeting in April 2018, and 3) to make the project attractive to stakeholders, increase the target audience and maximise the impact of the project.

2.2 Methodology

The newsletter was designed and edited by the AFZ team using texts and photographs created by AFZ and the consortium partners. Each Work Package leader contributed to the annual newsletter by writing a short progress report.

2.3 Results

2.3.1 Delivery format

The fourth Feed-a-Gene newsletter is provided in three formats.

- As a printable PDF brochure in A4 format. The document is 14-page long, in colour and it uses the visual identity guidelines defined in Deliverable 7.1.
- As an email sent to stakeholders and partners with links to individual articles.
- As a page on the Feed-a-Gene website that links to individual articles.

The PDF and the page are available at http://www.feed-a-gene.eu/newsletter/feed-a-gene-newsletter-4.

The PDF is presented in the following pages:

Feed-a-Gene

Newsletter #4

June 2019

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

Editorial

Dear readers,

We are proud to present the fourth newsletter of the Feed-a-Gene project funded through the Horizon 2020 programme of the European Union. As our project is less than one year from its end, it has by now produced a large amount of results. This newsletter offers a comprehensive vision of the progress done during the last 12 months as it was presented during the 4th annual meeting held on 14-16 May 2019 in Budapest, Hungary.

The **final meeting of Feed-a-Gene** will take place in January 2020 in Rennes, France. This event will be the perfect opportunity for stakeholders to discover the results and technologies produced by Feed-a-Gene, and to be prepared to transform these outputs into working innovations. We certainly hope to see you in Rennes next year!

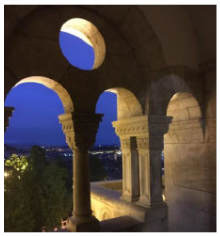
Jaap van Milgen (INRA)
Feed-a-Gene project coordinator

The Feed-a-Gene Project has received funding from the European Union's H2020 Programme under grant agreement no 633531

Feed-a-Gene

Fourth Feed-a-Gene Annual meeting

Budapest, Hungary



The fourth annual meeting of the Feed-a-Gene project took place on 14-16 May in Budapest, Hungary. It was organized by the staff of Kaposvár University, one of the project partners. The meeting was attended by 56 people.

The fourth annual meeting of the Feed-a-Gene programme was organized by Kaposvár University in Budapest. During this meeting, Feed-a-Gene partners presented the work done so far, shared their results and planned activities for the next year. All attendees appreciated the organization of the meeting by Veronika Halas and her team at Kaposvár University .

Feed-a-Gene project coordinator Jaap van Milgen and project manager Vincent Troillard would like to thank all the people at Kaposvár University who made this meeting possible and enjoyable.

A year of results

During the meeting, researchers presented 21 oral communications, more than twice the number presented in the last annual meeting. Feed-a-Gene has produced about 200 publications, including more than 20 peer-reviewed papers, and public deliverables that are now available on-line. A progress report is provided in pages 6-12.

Feed-a-Gene is now entering its last year and all the work packages are producing results. Some of those results, such as precision feeding systems and decision support tools are in the demonstration phase and in some cases in the preindustrial phase.

SmartCow

Dr. Nicolas Friggens (INRA AgroParisTech) presented SmartCow, (www.smartcow.eu) a H2020 European project (2018-202) that integrates key European cattle research infrastructures to promote their use and development and thereby help the European cattle sector face the challenge of sustainable production. Covering all the relevant scientific fields and the diversity of cattle types and production systems, SmartCow will provide the research communities with easy access to 11 major research infrastructures from 7 countries, in order to develop innovative and ethical solutions for efficient use of animal and feed resources that promote animal welfare and healthy livestock, as well as sustainable competitiveness.

Ontologies for livestock: a tool for knowledge sharing and phenotypic data exploitation

Linh Chi Nguyen and Catherine Hurtaud (INRA) presented the concept of ontology. An ontology is a formal way of representing knowledge in which concepts in a particular field of knowledge are described both by their meaning and their relationship to each other. Of particular interest for Feed-a-Gene is ATOL (Animal Trait Ontology for Livestock, www.atol-ontology.com), a multi-species and multi-disciplinary ontology of characteristics defining phenotypes of livestock in their environment that is developed and maintained by INRA.

From top to bottom, left to right:

- Galina Dukhta (KU)
- Jaap van Milgen (INRA)
- Hélène Gilbert (INRA)
- Sandrine Espagnol (IFIP)
- Jesús Pomar (UdL)
- Veronika Halas (KU)
- Feed-a-Gene Annual meeting in Budapest
- Linh Chi Nguyen and Catherine Hurtaud (INRA)

Joint Feed-a-Gene/SAPHIR stakeholder sessions

Three joint Feed-a-Gene/SAPHIR meetings took place in 2018. Those meetings were an occasion for researchers and stakeholders working in animal genetics, nutrition and health to discuss and share perspectives.

Multidisciplinary approaches for improving sustainable livestock production

This stakeholder session was held on 30 August 2018 at the EAAP annual meeting in Dubrovnik, Croatia. Its objective was to address and discuss the challenges and opportunities in multidisciplinary research in livestock production. As there is no "one-size-fits-all" solution, how can different actors and stakeholders make collectively best use of disciplinary knowledge and levers to make livestock production more sustainable? This session was attended by about 150 people. It featured 18 communications and two discussion panels, one about research needs and one about stakeholders needs. The videos of the Feed-a-Gene communications and of the panel discussions can be watched on the Feed-a-Gene's YouTube channel.

Millions of data! Too many or too few for livestock farms of tomorrow

This stakeholder session was held in French on 11 September 2018 in Rennes, France, during the SPACE Agricultural Trade Show. Attended by 100 people, most of them French stakeholders, it featured 5 communications by INRA researchers. Its objective was to discuss the use of "big data" to improve animal performance and animal health in livestock farms. The presentations are available on the Feed-a-Gene website.

Novel tools for healthier and efficient livestock: from research to application

This stakeholder session was held on 14 October 2018 in Hanover, Germany, during the EuroTier Trade Show. It featured 8 communications and a plenary session. The videos of the communications by K. E. Bach Knudsen (Aarhus University), A. Jansman (WUR), and V. Heuzé (AFZ) can be watched on the Feed-a-Gene's YouTube channel.

Feed-a-Gene

- EAAP: Jaap van Milgen and Marie-Hélène Pinard-van der Laan (INRA)
- EAAP: Camille Bellet (U. Liverpool), Marianne Cerf (INRA), Claire Rogel-Gaillard (INRA), Dominiek Maas (U. Ghent), Hieu Nguyen Ba (INRA), Mathilde Le Sciellour (INRA)
- SPACE: stakeholder session
- EuroTier: Feed-a-Gene / SAPHIR booth

FeedUtiliGene: a Decision Support System for monogastric livestock production systems

FeedUtiliGene was presented during a demonstration session held in Budapest on 11 October 2018.

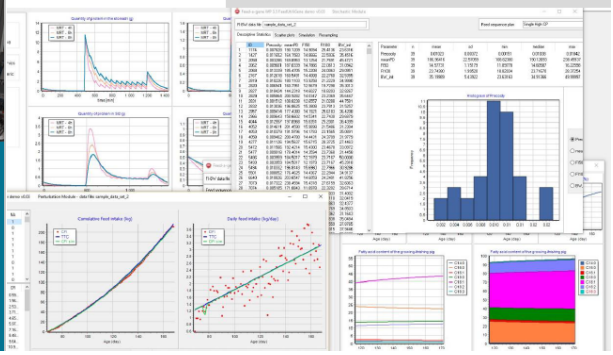
Developed for pigs and poultry, FeedUtiliGene integrates different models of:

- Digestion, digestibility of nutrients in feeds ingredients and diets
- Metabolic utilization and partitioning of nutrients
- Robustness of animals as a response to perturbations
- Individual variation

During the demonstration, the participants were able to install and test a preliminary version of the software and to interact with the researchers responsible for the creation of the biological models and of the software.

FeedUtiliGene is available upon request at: halas.veronika@ke.hu

Screenshots of FeedUtiliGene



Progress reports for the Feed-a-Gene project

Alternative feed ingredients and real-time characterisation (WP1)

WP leader: Knud Erik Bach Knudsen, knuderik.bachknudsen@anis.au.dk

Production of novel feed protein from rapeseed and European grown soybeans

- A novel process for rapeseed meal improved detoxification and increased protein content from 44 to 53-57% of DM. Compared to a conventional process, desolventizing required similar energy but was less damaging to proteins.

Production of novel feed protein from green biomass

- In 2016-2017, the protein content of green biomass produced was lower than that of soybean meal, due to high ash content and inefficient protein precipitation.
- In 2017-2018, a better harvesting procedure and precipitation by heat rather than by fermentation increased protein concentration and quality.
- *In vitro* protein digestion of green biomass was comparable to or higher than that of soybean meal.
- Enzyme treatment during protein extraction enhanced hydrolysis in ryegrass and red clover.

Novel feed-processing technology to upgrade alternative feed ingredients

- The fine fraction of rapeseed meal resulting from fractionation was significantly richer in protein and contained less dietary fibre.
- No over-processing occurred during fractionation.

Green protein (AU)

Nutritional evaluation of novel feed ingredients

- In pigs, European soybean meals obtained by extrusion-pressing or flaking-cooking-pressing without dehulling have a higher standardized ileal digestibility (SID) of amino acids than a high-quality commercial meal.
- When using non-dehulled beans, SID of amino acids and protein is lower than for the control soybean meal, which may be attributed to a relatively high trypsin inhibitor activity.
- SID of green protein materials (rye grass, red clover and lucerne) was lower than that of soybean meal. The protein concentration and digestibility of protein needs to be improved to make it an attractive alternative source of protein for pigs.
- The fine fraction of rapeseed meal resulting from fractionation had higher energy and nutrient digestibilities and resulted in a significantly higher performance (daily weight gain, feed conversion ratio) without affecting the feed intake.
- The net energy of several protein sources (corn germ meal, corn gluten feed, solvent-extracted peanut meal, dehulled sunflower meal, soybean meal, expeller-pressed rapeseed meal, solvent-extracted rapeseed meal, canola meal, cottonseed meal) was determined by indirect calorimetry.

Improvements in nutritive value by use of novel enzymes

- In broilers, inclusion of rapeseed meal reduced performance during the growing period only. There were no effects of enzyme supplementation on performance or on digesta viscosity. Inclusion of proteases and NSPases resulted in lower DM digestibility at the end of the grower phase.
- In pigs, xylanase supplementation improved daily weight gain and feed intake, and increased nutrient and energy digestibilities. It increased the acetic acid concentration in the ileum and the caecum and decreased the concentration of the lactate, iso-butyric acid and n-pentanoic acid in the colon.

New methodologies for characterisation of nutrient composition and value

- Predictive calibrations for amino acids and protein have been tested for 791 feed samples. NIR predictions of amino acids are better than estimates from protein regression. Feed mixtures are the more difficult group to predict. Models offer good accuracy and are valid for a large range of sample types.
- Predictive models for *in vivo* and *in vitro* digestibilities have been developed and tested. For the digestibility of energy, the NIR prediction was better than a commonly used *in vitro* method.
- Processing of green protein and rapeseed meal affected the rate and/or maximum degree of protein hydrolysis but no substantial damage on lysine was observed.

Identification of feed efficiency traits related to individual diversity (WP2)

WP leader: Alfons Jansman alfons.jansman@wur.nl

Individual feed intake and feeding behaviour in broilers and rabbits - New phenotypes to improve feed efficiency

- Data of body weight and feed intake of broilers at each visit of birds to the feeding station were collected. The algorithm of calculation of individual feed intake per visit has been established and is currently being adjusted.
- For rabbits, a device has been developed to measure individual feed intake in collective cages and is in use in further research. Traits related to feed efficiency are being studied and explored in relation to feeding behaviour.

Coarse (left) and fine (right) fractions of rapeseed meal (Bühler)

Broiler feeding station (INRA)

New traits and technologies for measuring and improving digestive efficiency and gut health in pigs, poultry and rabbits

- In piglets, dietary organic acids and essential oils could improve the gastrointestinal environment, including nutrient digestion, microbiota composition, and activity of digestive enzymes.
- In pigs, predictions of OM, DM, N and energy digestibilities from faecal NIRS spectra were excellent (R^2 from 86 to 90%).
- In pigs, 16S rRNA microbiota information failed to predict feed efficiency.
- In rabbits, caecal microbiota explains part of the phenotypic variance of performance traits, but prediction of animal performance did not improve when microbial data were included in the model.

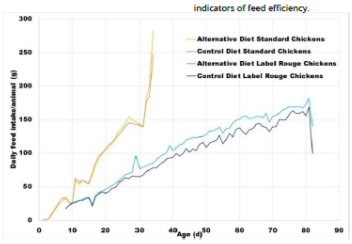
Nutrient metabolism related traits to improve feed efficiency

- In pigs, birthweight and protein deposition potential both affected absolute retention of body protein in the grower phase. N efficiency is however only influenced by protein

Feed-a-Gene

deposition potential, not by birthweight.

- Young pigs with a better performance and digestive efficiency had a lower protein turnover and lower fat incorporation rates compared to older pigs. Rates of both protein and fat differed between genotypes and seemed to depend on the dietary condition.
- Pigs with a higher growth performance had a lower amino acid turnover and less fat deposition in muscle and liver. Dietary protein level altered fat metabolism.
- Individuals with a low feed efficiency had a different fermentation profile, lower microbiota biodiversity, and showed an increase of *Bacteroidetes* and an higher *Bacteriodetes / Firmicutes* ratio.
- In piglets, predictive biomarkers for digestive efficiency (fermentation metabolites, diversity index in the caecal ecosystem, specific microbiota taxa) all correlated negatively with high digestive efficiency.



Age vs. daily feed intake in standard and Label Rouge broilers fed standard or alternative diets (INRA)

Feed-a-Gene

Behaviour and welfare related traits influencing feed efficiency

- Results point to a relatively low correlation between behavioural data and feed efficiency traits.
- Video recording associated to deep learning was able to track individual pigs in group-housed systems with good precision. 3D cameras could obtain reliable estimates of sitting/standing behaviour.

Metabolomics to identify new traits for improvement of feed efficiency

- In pigs, urine analysis made it possible to discriminate between dietary protein regimes and between breeding value for protein deposition. Several metabolites were responsible for the separation of low and high protein deposition.
- In chickens, the ileal, caecal, and serum metabolome explained a large part of the variability of digestive efficiency. Absorbance of serum at 492 nm is strongly correlated to digestive efficiency.
- In pigs, blood biomarkers measured at an early stage were good indicators of feed efficiency.

Modelling feed use mechanisms and animal response to nutrient supply and environmental challenges (WP3)

WP leader: Veronika Halas
veronika.halas@ke.hu

Digestive utilisation of feed and nutrients

- The digestive model now integrates a more detailed representation of the mechanisms of phosphorus and calcium digestibility, and is being included in the model developed in MATLAB.

Metabolic utilisation of feed and nutrients

- The pig model is able to design daily tailored feeds for predision feeding.
- The broiler model was used to evaluate different feeding strategies.
- The first version of the layer model predicts the effect of the digestible nutrient supply, including energy, amino acids, Ca and P, on egg production, and it estimates the SID amino acid, digestible Ca and P requirement of laying hens.

Accounting for environmental variability, system disturbance and robustness

- Applying the perturbation model to mycotoxin data indicate that the procedure can detect precisely the period when pigs were perturbed by mycotoxins.

Accounting for variation among individuals in nutrient digestion and metabolism processes

- A new modelling approach for characterising variability in egg production and sow reproductive performance was developed and tested. A general method was developed to relate feed intake and body weight and efficiency of feed utilisation over time using any specified time resolution.

Delivery of a Decision Support Tool

- A version of the FeedUtiliGene Decision Support Software (DSS) containing all models has been completed.
- This version was demonstrated during a dedicated workshop and was positively evaluated by the participants.

Management systems for precision feeding to increase resilience to fluctuating environments (WP4)

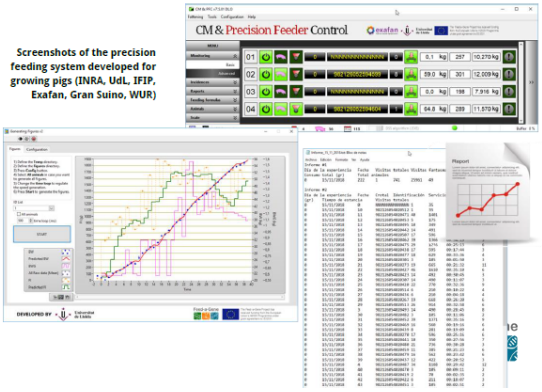
WP leader: Jesús Pomar
pomar@eagrof.udl.es

Building and validation of precision feeding system prototypes

- For growing pigs, the functional integration of the precision feeders and DSS was accomplished and some improvements were proposed.
- The pre-commercial precision feeding system was delivered for demonstration purposes at a commercial farm in Italy and for validation purposes at WUR.
- The DSS was able to calculate the daily formulation for each animal in the farm. Preliminary results suggest that low birthweight pigs may benefit from precision feeding.
- In broilers, experimental results were used to validate the DSS (performance, body composition).
- A first model to estimate daily nutritional requirement for energy, proteins, calcium, and phosphorus in laying hens is now available.

Demonstration activities

- A precision feeding system for growing pigs fed *ad libitum* has been developed and installed in a commercial pig farm in the Parma region. The software prototype integrates the controlling module, data management, and the DSS.
- A room equipped with a precision feeder prototype for growing pigs under restricted feeding is ready in the IFIP facilities for demonstration purposes.



Screenshots of the precision feeding system developed for growing pigs (INRA, UdL, IFIP, Exafan, Gran Suino, WUR)

Use of new traits in animal selection (WP5)

WP leader: Hélène Gilbert
helene.gilbert@inra.fr

Genetics of components of feed efficiency and robustness indicators

- New traits for feed efficiency in growing animals (individual feed records, digestive efficiency, haematological measurements, serum absorbance) have moderate to high heritabilities and can be used for selection.
- In sows, feeding records had different heritabilities depending on the breed, and certainly on animal management.
- Differentially expressed genes after a challenge depended on the line of pigs, whereas genes were similar in layer lines.

Genetic relationships between the gut microbiota and feed efficiency

- Significant chromosomic regions were identified for individual growth, feed intake, and feed efficiency.
- The heritability estimates and significant signals detected for microbiota OTUs in pigs and rabbits validated a host control of fractions of the gut microbiota in rabbits, suggesting possible selection of some OTU abundance.

Statistical-genetic modelling of feed efficiency and robustness features

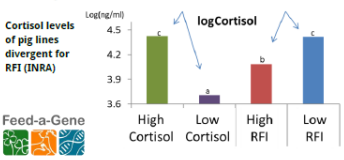
- Group measurements of feed efficiency were genetically uncorrelated with production traits. Response to selection on longitudinal ADG using indirect genetic effects showed different dynamics with time.
- Multitrait double hierarchical generalized linear models analyses suggested the existence of global robustness across traits. Prediction accuracies and biases were low for longitudinal records.

Selection strategies to account for crossbred and genomic data for a sustainable selection for feed efficiency

- When selection was placed on FCR itself, it decreased by 7.1%, from 2.52 to 2.34 (kg/kg). Other traits that reduced FCR were: dry matter digestibility, daily feed intake, average daily gain, eating time per day, nitrogen excreted, group daily feed intake, lesion counts, *Alloprevotella*, joint lesions, and growth rate with social effect.

Demonstration of the value of social interactions and crossbred information in selection to improve feed efficiency

- In pigs, breeding values for indirect genetic effects (social effects) have been accumulated for testing their relationships with feed efficiency and behaviour.
- In rabbits, promising heritability estimations were obtained, but it is too early to conclude about the response to selection.



Cortisol levels of pig lines divergent for RFI (INRA)

Feed-a-Gene

Sustainability assessment of production systems (WP6)

WP leader: Guy Garrod
guy.garrod@newcastle.ac.uk

Life Cycle Assessment of proposed management systems

- Two innovative feeding strategies were assessed: (1) the use of new European protein sources to replace Brazilian soybean meal associated with deforestation and (2) individual precision feeding strategies.
- Different formulation scenarios were defined to estimate the potential of using innovative feed ingredients to reduce the environmental impact of pig and broiler production.
- Feed formulation was carried out for all scenarios in conventional pigs using four price contexts in France, Netherlands, Germany, and Spain.
- 14 scenarios for broiler production were investigated. LCA for those scenarios was conducted.

On-farm evaluation of proposed management systems

- Preliminary results of baseline analysis for pig growing/finishing production have been obtained.

Evaluation of consumer and farmer attitudes

- A survey was designed to estimate values associated with the externality attributes of animal products, and to investigate the consumer acceptability of feed technologies. The survey was undertaken in the UK and Spain.
- An interview schedule was designed to investigate the attitudes of farmers in the UK and Spain to the introduction of novel feeding strategies.

Dissemination, training and technology transfer (WP7)

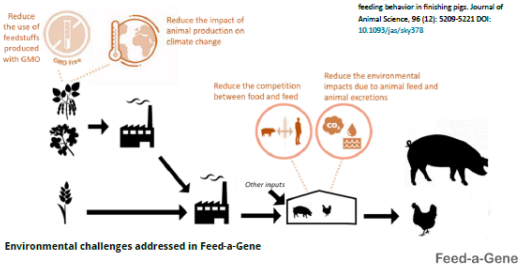
Stakeholder events

In addition to the 3 joint Feed-a-Gene/SAPHIR meetings described previously, 3 other events were organized:

- Hands-on demonstration of the FeedUtiliGene DSS (Budapest, Hungary).
- Demonstration of the precision feeding system for growing pigs (SPACE, Rennes, France).
- Stakeholder workshop on feed efficiency in rabbits (Caldes de Montbui, Spain).

Other events

- Researchers participated in many other international and national events, including EPC (Croatia), JRP (France), Feed Additive Global (Netherlands), PSA Latin America (Brazil), PAGC (USA), ASESCU (Spain), Animal Microbiome Congress (Paris), PREGA (Hungart), DPC (Australia), AASV (Australia)



Environmental challenges addressed in Feed-a-Gene

Feed-a-Gene

Publications

Feed-a-Gene researchers have made more than 150 publications, including 21 peer-reviewed papers. Here are the 14 papers published since May 2018.

- Formoso-Rafferty N., Cervantes I., Sánchez J.P., Gutiérrez J.P., Bodin L., 2019. Effect of feed restriction on the environmental variability of birth weight in divergently selected lines of mice. Genetics Selection Evolution, 51: 27 DOI: 10.1186/s12711-019-0471-9
- Tusell L., Gilbert H., Vitezica Z.G., Mercat M.J., Legarra A., Larzul C., 2019. Dissecting total genetic variance into additive and dominance components of purebred and crossbred pig traits. Journal of Animal Science, 23 May 2019 DOI: 10.1017/S1751731119001046
- Piles M., Sánchez J.P., 2018. Using group records of feed intake to select for feed efficiency in rabbit. Journal of Animal Breeding and Genetics DOI: 10.1111/jbg.12395
- Garreau H., Ruesche J., Gilbert H., Balmisse E., Benitez F., Richard P., David I., Drouilhet L., Zemb O., 2018. Estimating direct genetic and maternal effects affecting rabbit growth and feed efficiency with a factorial design. Journal of Animal Breeding and Genetics, 2019, 00:1-6 DOI: 10.1111/jbg.12380
- Dukhta G., van Milgen J., Kövér G., Halas V., 2018. A growth model to predict body weight and body composition of broilers. Acta Agraria Debreceniensis, 75: 17-24
- Serviento A.M., Brossard L., Renaudeau D., 2018. An acute challenge with a deoxynivalenol-contaminated diet has short- and longterm effects on performance and feeding behavior in finishing pigs. Journal of Animal Science, 96 (12): 5209-5221 DOI: 10.1093/jas/sky378

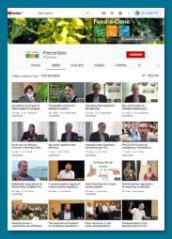
- Van Grevenhof E.M., Vandenplas J., Calus M.P.L., 2018. Genomic prediction for crossbred performance using metafounders. Journal of Animal Science DOI: 10.1093/jas/sky433
- Seradj A. R., Balcells J., Morazan H., Alvarez-Rodriguez J., Babot D., De la Fuente G., 2018. The impact of reducing dietary crude protein and increasing total dietary fiber on hindgut fermentation, the methanogen community and gas emission in growing pigs. Animal Feed Science and Technology, 245: 54-66 DOI: 10.1016/j.anifeedsci.2018.09.005
- Le Sciellour M., Labussière E., Zemb O., Renaudeau D., 2018. Effect of dietary fiber content on nutrient digestibility and fecal microbiota composition in growing-finishing pigs. PLOS One, 13 (10): e0206159 DOI: 10.1371/journal.pone.0206159
- Beaucleroq S., Lefèvre A., Nadal-Desbarats L., Germain K., Praud C., Emond P., Le Bihan-Duval E., Mignon-Grasteau S., 2018. Does lipidomic serum analysis help in the assessment of digestive efficiency in chickens?. Poultry Science, 16 October 2018 DOI: 10.3382/ps/pey483
- Velasco-Galilea M., Piles M., Viñas M., Rafel O., González-Rodríguez O., Guivernau M., Sánchez, J.P., 2018. Rabbit microbiota changes throughout the intestinal tract. Frontiers in Microbiology, 13 September 2018 DOI: 10.3389/fmicb.2018.02144
- Tallentire C.W., Mackenzie S.G., Kyriazakis, I., 2018. Can novel ingredients replace soybeans and reduce the environmental burdens of European livestock systems in the future?. Journal of Cleaner Production, 187: 338-347 DOI: 10.1016/j.jclepro.2018.03.212
- Ragab M., Piles M., Quintanilla R., Sánchez J.P., 2018. Indirect genetic effect model using feeding behaviour traits to define the degree of interaction between mates: an implementation in pigs growth rate. Animal, 12 (7): 1-9 DOI: 10.1017/S1751731117001192
- David I., Sánchez J.P., Piles M., 2018. Longitudinal analysis of direct and indirect effects on the average daily gain in growing rabbits using a structured antedependence model. Genetics Selection Evolution, 50: 25 DOI: 10.1186/s12711-018-0395-9

Feed-a-Gene

YouTube

About 50 videos are now available on our YouTube channel

www.youtube.com/FeedageneEuProject



Download books of abstracts and about 200 communications, peer-reviewed papers and deliverables from the Feed-a-Gene website!

www.feed-a-gene.eu

Join Feed-a-Gene on social media!

www.facebook/feedagene
twitter.com/FeedaGene
www.linkedin.com/company/feed-a-gene
www.youtube.com/FeedageneEuProject
www.researchgate.net/project/Feed-a-Gene-3

SAB recommendations: focus on reaching stakeholders and policy makers

The stakeholder advisory board (SAB) praised the project for its management, the positive attitude of its research teams and its promising results.

- Its main recommendation is to focus on creating and delivering communication material that will integrate seamlessly the results of the different work packages. The messages should be tailored to specific groups of stakeholders.
- For stakeholders including farmers and industry: factsheets, practice abstracts, articles for trade magazines, webinars, press releases.
- For policy makers: policy briefs. Some policy briefs could focus on recommendations for follow-up activities (Innovation Actions) and research projects (Research and Innovation Actions, FP9).

SAB members: Jan Venneman (EFFAB), Harinder Makkar

Upcoming conferences

Feed-a-Gene researchers will present communications in the following conferences in 2019.

ISAG 2019

37th International Society for Animal Genetics Conference, 7-12 July 2019, Lleida, Spain

ASAS-CSAS 2019

Annual meeting & Trade show, 8-11 July 2019, Austin Convention Center, Austin, Texas, USA

70th EAAP Annual meeting

70th Annual Meeting of the European Federation of Animal Science, 26-30 August 2019, Ghent, Belgium

ISEP 2019

6th International Symposium on Energy and Protein Metabolism and Nutrition, 9-12 September 2019, Belo Horizonte, Minas Gerais, Brazil

MODNUT 2019

9th Workshop on Modelling Nutrient Digestion and Utilization in Farm Animals, 14-16 September 2019, Ubatuba, Brazil

WIANF

3rd World Conference on Innovative Animal Nutrition and Feeding, 9-11 October 2019, Central European University, Budapest, Hungary

ESPG 2019

11th European symposium on Poultry Genetics, 23–25 October 2019, Prague, Czech Republic

AAABG 2019

Association for the Advancement of Animal Breeding and Genetics, 27 October - 1 November 2019, University of New England, Armidale, NSW, Australia,

Feed-a-Gene

Future Feed-a-Gene events

- On-farm demonstration of precision feeding for pigs: open days for farmers and extension services, Mid-2019, Parma region, Italy
- Protein autonomy, more and better: presentation of new feeds and feed processing technologies, October 2019, FEFAC annual meeting, Denmark
- Meeting with policy makers, 6th November 2019, Brussels, Belgium, Animal Task Force meeting

Feed-a-Gene final meeting

January 2020, Rennes, France

During this event, stakeholders will be able to interact with Feed-a-Gene researchers

- Presentation of the results and technologies developed through the Feed-a-Gene programme
- Live demonstrations: decision support tools, precision feeders
- Workshops: "From Feed-a-Gene results to innovation" on applicability and exploitation of Feed-a-Gene results

Registration will be open soon!

Feed-a-Gene Newsletter #4
June 2019

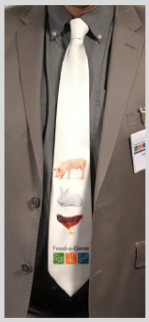
Photo credits

Pages 1: Patrick Carré (OLEAD). 2-5: Gilles Tran (AFZ) & Valérie Heuré (AFZ). 6: Helle Nygaard Lærke (AU). 7: INRA Tours; Bülher. 10: Exafan. 13: Gilles Tran (AFZ). 14: Edouard Hue; Valérie Heuré (AFZ)

Conception and design

Association française de zootechnie

Feed-a-Gene



The unique Feed-a-Gene tie!

www.feed-a-gene.eu

2.3.2 Contents

The fourth Feed-a-Gene newsletter contains the following:

- Editorial by the Project coordinator Jaap van Milgen (INRA)
- A short report about the 4th Feed-a-Gene annual meeting in May 2019 in Budapest
- A note about the three joint Feed-a-Gene/SAPHIR stakeholder meetings that took place in 2018 (Dubrovnik, Rennes, and Hanover)
- Progress reports for the Feed-a-Gene project
- A list of 14 peer-reviewed papers published since the 3rd newsletter
- Upcoming conferences and planned Feed-a-Gene events

2.3.3 Dissemination

An email informing of the publication of the 4th annual newsletter was sent to 431 registered stakeholders on 26 June 2019.

The newsletters are available to all visitors on the website (https://www.feed-a-gene.eu/media/newsletter). Information about the newsletters was disseminated on social media (Facebook, Twitter, LinkedIn).

3 Demonstrations events

Two demonstration events were organized in 2018.

3.1 Demonstration of the Decision Support System (DSS) for precision feeding

This demonstration took place during the SPACE Agricultural Trade Show in Rennes, France on 10-13 October 2018. A video in French produced by INRA and IFIP titled “Alimentation des porcs charcutiers, comment ça marche ? » (« Precision feeding of growing pigs, how does it work?”) was shown on a computer installed at the INRA booth. Three INRA researchers (Ludovic Brossard, Raphaël Gautier, and Charlotte Gaillard) were present on the booth to present the video and give explanations to visitors. They interacted with about 30 people (industry, farmer cooperatives, teachers in animal production, students and journalists).

3.2 Demonstration of the Decision Support System (DSS) for biological modelling

This demonstration took place in Budapest, Hungary, on 11 October 2018, under the title “FeedUtiliGene: a Decision Support System for monogastric livestock production systems”. The audience consisted of 27 people from 8 countries. The agenda included a presentation of the Decision Support System, a discussion of the basic models and concepts and their applicability, a hands-on demonstration of the DSS, and a session for user feedback. Participants were able to install and test a preliminary version of the software.

4 Stakeholder meetings

Four stakeholder meetings took place in 2018. Three of those meetings were organized jointly by Feed-a-Gene and SAPHIR and were an occasion for researchers and stakeholders

working in animal genetics, nutrition, and health to discuss and share perspectives. A fourth stakeholder meeting was organized by IRTA.

4.1 Multidisciplinary approaches for improving sustainable livestock production

This joint Feed-a-Gene/SAPHIR stakeholder session was held on 30 August 2018 at the EAAP annual meeting in Dubrovnik, Croatia. Its objective was to address and discuss the challenges and opportunities in multidisciplinary research in livestock production. This session was attended by about 150 people. It featured 18 communications and two discussion panels, one about research needs and one about stakeholders needs. The videos of the Feed-a-Gene communications and of the panel discussions can be watched on Feed-a-Gene's YouTube channel.

4.2 Millions of data! Too many or too few for livestock farms of tomorrow

This joint Feed-a-Gene/SAPHIR stakeholder session was held on 11 September 2018 in Rennes, France, during the SPACE Agricultural Trade Show. Its objective was to discuss the use of "big data" to improve animal performance and animal health in livestock farms. Attended by 100 people, most of them French stakeholders, it featured five communications by INRA researchers. The presentations are available on the Feed-a-Gene website.

4.3 Novel tools for healthier and efficient livestock: from research to application

This joint Feed-a-Gene/SAPHIR stakeholder session was held on 14 October 2018 in Hanover, Germany, during the EuroTier Trade Show. It featured eight communications and a plenary session. The videos of the communications can be watched on Feed-a-Gene's YouTube channel.

4.4 Feed efficiency in rabbit farming: its improvement and impact on farms

This session was organized by IRTA on 10 October 2018 in Caldes de Montbui, Spain. The objective was to present the factors that affect feed efficiency in rabbit farms, particularly in the Spanish rabbit sector. It included five communications and a round table. The audience consisted of Spanish rabbit farmers, veterinarians and farm advisors.

5 Conclusions

The fourth newsletter is a dissemination tool meant to inform stakeholders and consortium partners of the current state of the project and of the progress made so far.

The demonstrations showed practical results of the work done in WP3 (software) and WP4 (software and hardware) and were an occasion to interact with potential users. The four stakeholder meetings gathered national (SPACE and the IRTA meeting) and international audiences (EAAP and EuroTier).

6 Partners involved in the work

All partners contributed this deliverable.

7 Annexes

- Fourth Feed-a-Gene newsletter in PDF format.
- Minutes of the two demonstrations and links to the videos of the EAAP meeting.
- Flyers of the EAAP, EuroTier, SPACE, and IRTA meetings and demonstrations.

Minutes of the stakeholder meeting and of the two demonstration events

Annex to Deliverable 7.6

Feed-a-Gene, Association française de zootechnie, 20 June 2018

Joint Feed-a-Gene/SAPHIR stakeholder meeting, 30 August 2018, Dubrovnik, Croatia

This stakeholder session was held on 30 August 2018 at the EAAP annual meeting in Dubrovnik, Croatia. Its objective was to address and discuss the challenges and opportunities in multidisciplinary research in livestock production. This session was attended by about 150 people, who also received a paper copy of the book of abstracts of the session. It featured 18 communications from Feed-a-Gene and SAPHIR researchers and from industry stakeholders. There were two discussion panels, one about research needs and one about stakeholders needs.

The communications and the panels were filmed and the videos have been uploaded on Feed-a-Gene's YouTube channel in a specific playlist: https://www.youtube.com/playlist?list=PLxk-vnpldeUXFfnjwCvCUE3LSyunfmduc

The whole panel discussions can be watched here:

- Panel discussion 1: opportunities and difficulties in multi-disciplinary and multi-actor research (54 minutes) https://youtu.be/cySHkuo-FQQ
- Panel discussion 2: user needs and applications (22 minutes) https://youtu.be/xxvfdjaMqoQ

Demonstration of the precision feeding system for growing pigs, 10-13 September 2018, Rennes, France

This demonstration took place during the SPACE Agricultural Trade Show in Rennes, France. A video in French produced by INRA and IFIP titled « Alimentation des porcs charcutiers, comment ça marche ? » ("Precision feeding of growing pigs, how does it work?") was shown on a computer on the INRA booth. Three INRA researchers (Ludovic Brossard, Raphaël Gautier, and Charlotte Gaillard) were present at the booth to present the video and give explanations to visitors. They interacted with about 30 people (industry, farmer cooperatives, teachers in animal production, students, and journalists). The video, in French with English subtitles, was posted on the YouTube channels of Feed-a-Gene (https://youtu.be/mSeUsrpZ810) and IFIP (https://youtu.be/Z8OzNeBZoNs) where it was seen about 650 times.

Transcript of the video

The video is presented to you by IFIP and INRA for the Feed-a-Gene project.

How to apply in practice the principles of precision feeding? The objective of the model is to adapt the quantity and quality of the diet to the requirements of each pig. The pigs whose nutrient requirements are not met by the supply have a slower growth performance. When the supply is higher than the requirements, feed is wasted, resulting in nutrient excretion and economic loss. With precision feeding, the supply corresponds to the requirements for each animal, every day.

Precision feeding first requires data obtained at the individual level. RFID identification of the pig is key. Under restricted feeding, the eating pig is protected by doors to prevent feed stealing by others. Under *ad libitum* feeding, the feeder does not require this.

A full system is required to implement precision feeding. The pen needs a living area, a sorting station, and an access to the feeding area or a sorting area depending on the farmer's needs. Weighing animals is fundamental for modelling their nutrient requirements. The animal is identified by the RFID antenna through a chip in the ear tag. Strain gauges allow to weigh the pig. The device records the pig weight and send the information to a database to allow the calculation of the feed intake level for the day.

Case 1: the animal as already eaten its entire daily ration. The pig returns to the living area.

Case 2: the animal has not yet eaten its entire daily ration. The animal can proceed to the feeding area.

Case 3: the pig lost its ear tag with RFID chip or the farmer wants to check the animal. The pig goes to the sorting area. The RFID chip is identified by the antenna in the feeding station.

Available feed A: 1200 g. Available feed B: 498 g. Feed A has a high level of amino acids. Feed B is low in amino acids.

The precision feeding model requires 6 steps. Step 1: data acquisition. Every day, a summary file for each pig is recorded in the database. Step 2: it is necessary to clean the data to make the model more reliable. Once recorded, the data are cleaned. The weight of pig 007325542 for today is the mean of the remaining correct weights, i.e. 72.7 kg. Step 3: once the data are clean, missing data are completed if necessary. A weight is missing for this particular day. A value is predicted to complete the series. Step 4: once the data series is completed for this pig, the weight for the next day is predicted. Under ad libitum feeding, intake is predicted from previous intake data. Step 5: once the weight for the next day is predicted. it is necessary to predict the weight gain for the next day using a regression analysis on the past 20 days. Step 6: using the weight and weight gain for the next day, the quantity of lysine expressed in g/day is calculated and converted into percentages of feed A and feed B to be provided in the diet. Under restricted feeding, the pig will be given at most 1729 g of the feed comprised of 70% of feed A and 30% of feed B. Both feeds will be provided in doses of 100 g. Under ad libitum feeding, the feeder device will give the animal a diet comprised of 70% feed A and 30% feed B calculated from the predicted intake.

Precision feeding consists in feeding each pig according to its needs in preventing waste and excretions thus increasing the performance of livestock farms.

Demonstration of the Decision Support System (FeedUtiliGene) for modelling biological functions, 11 October 2018, Budapest, Hungary

This demonstration was a full-day event. The audience consisted of 27 people from 8 countries. The agenda included a presentation of the Decision Support System, a discussion of the basic models and concepts and their applicability, a hands-on demonstration of the DSS, and a session for user feedback.

Below are some excerpts of the discussions (the recorded sound quality was insufficient to capture the entire exchanges).

Modelling the transit and digestion of nutrients in pigs and broilers

Emilie Recoules

We validated the broiler model with research data and with standard diets. They have not been validated with other diets. We are confident that is should be able to have good predictions.

Veronika Halas

The validation for normal diet has already been done, and it shows the contrast between diets. With literature or other data, you can challenge the model and you can see if the outputs are fine. That was done, but there is still room for improvement, especially or the fibre part.

Jaap van Milgen

In the process of converting the pig model to a broiler model, we have gone through some extreme cases. For example, is 1 kg broiler the same as 1 kg pig? That was the starting question, and the answer is no. What makes 1 kg broiler different from a 1 kg pig? This was a very extreme case of challenging the model and forces us to think what makes two species of the same body weight different. These models are not perfect but they force us to think about commonalities, differences, and interactions and this has been very challenging.

There was no poultry digestion model available in the literature. The question when we started it was "Are we going to build a new one from scratch?". However, there are digestion models for pigs, and we decided to have a poultry model with the same structure as the pig model. We said "Let us try it and see where it fails, if it fails, we will go back to the drawing board". That is the philosophy of modelling: start simple, try it, and if it does not do what we want, add things that are needed. This is different from making a more complicated and complex model from the start on, which involves the risk of losing control.

General comments

Veronika Halas

On the growth models: in case of heat stress or cold stress, we increase the maintenance energy expenditure but we will verify this with more literature data. If you have data that allow you to quantify the mechanism, then you can integrate it in your model. If you do not have that, and you want to include that aspect in a model, you have to make assumptions. We a have nice data set showing and quantifying the effect of heat stress. We quantified how a change in temperature affected the maintenance requirement for thermoregulation. We will challenge this by using literature data on the effect of heat stress on maintenance.

Jaap van Milgen

So far, our models have been based on concepts. In the future we may have to use a different approach, based more on data. For example, we now have the data on microbiome. How can we use this data in our models? Our concept-driven models are not ready for that. It will be a challenge to develop approaches based more on data. In data-driven approaches, there are no mechanisms, they are black box models. I think that we are not there yet to combine concept-driven approaches with data-driven approaches. But I think we have to do it.

On the perturbation model which deals with the response of pigs to perturbations such as heat stress: one example, perhaps not a good one, is immunocastration. It is a perturbation and results in an increase in feed intake. It is thus a positive perturbation because the pig is going to eat more. But it is also a more or less permanent perturbation. So, it is not only a perturbation, because the animal is changed permanently, especially its feed intake capacity. We have to think about "what is a perturbation?" Is it something that goes away because the animal recovers from it? Or is it something that will change the feed intake and growth potential of the animal. It can be long-lasting, and the animal may not have the time to recover from. Certain perturbations can be permanent and it then changes the animal.

Veronika Halas

On the use of the perturbation model: it is often thought that the best performing animals are also less robust to stress. I think that the model can be a very informative and useful tool to select animals that are highly performing and that they are robust. And with this tool, this can be quantified.

Jaap van Milgen

On the implementation of precision livestock feeding and farming: I think that the way we raise pigs will change in the future, but I do not know in what direction. With precision feeding, we can change the design of pens, but what should be the ideal size of a group of pigs: 10, 100, 1000? With a different number of animals per pen and with the same animal density, you will get differences in behaviour. With a pen of 100 animals, you will have pigs that run for 40 meters, while other a huddling together. So, we will have to think

about the designs of the production systems. In the future, we will get more and more data: by image analysis, by feeding stations, and we have to think how to transform the data into information.

In the project, we do a sustainability analysis based on the economics, environmental, the social acceptance of precision livestock farming. We will not provide all the answers, because there are many questions about precision livestock farming, not just for economics, but also for society. How will society look upon precision livestock farming with pigs surrounded by cameras and sensors. That will be a challenge. It has been shown that in terms of feed costs, environmental impact, precision livestock feeding has a great potential. We will have to assess the welfare aspects, but pigs that can run for 40 metres are different from pigs that do not have a lot of space around. There are many issues that we have to address for precision livestock farming in the future and we can provide some elements, but it is still a very recent method, and also the society will have an opinion about it. It has many benefits, but it also has aspects of the further industrialization of livestock production, animals being controlled by computers. How will the farmers look upon that, how will citizens look upon that? That is something that we have to consider. It cannot all be done in our project but it is something to be addressed in the near future.

Flyers of stakeholder meetings and demonstrations

Multi-disciplinary approaches for improving sustainable livestock production: research needs, opportunities and difficulties

Feed-a-Gene and SAPHIR joint session at EAAP 2018
30 August, Dubrovnik, Croatia
8:30-18:00, Hotel Valamar Lacroma Dubrovnik, Room Olipa 4

Highlights:

* Twists and turns in multi-disciplinary approaches in research projects
* Using feed intake to detect perturbations in pigs
* Phenotypic and transcriptomic characterization of layers to suboptimal diet
* Socio-economic evaluation of vaccines
* Genome-wide integrative approaches for vaccine response prediction
* Heat stress and microbiota composition
* Future of vaccination against *Mycoplasma hyopneumoniae* in pigs?

PANEL DISCUSSION 1: Opportunities/Difficulties of multi-disciplinary and multi-actor approach researches with invited speaker Marianne Cerf

* Innovation through sustainability in animal nutrition
* Expectations of stakeholders from research projects: breeding industry and OIE
* Thinking out of the box: presentations out of Feed-a-Gene and SAPHIR projects

PANEL DISCUSSION 2: User application needs with invited speakers Jean-Christophe Audonnet and Pieter Knap

www.feed-a-gene.eu and www.h2020-saphir.eu

Register here for EAAP 2018

SAPHIR and Feed-a-Gene have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633184 and 633531, and the European Union cannot be held responsible for any use which maybe made of the information contained therein.

SPACE 2018

PARC DES EXPO.
Rennes Aéroport

MARDI 11 SEPT.
14h • 16h
SALLE C
ESPACE EUROPE
Entrée libre

INVITATION · Les rendez-vous de l'Inra

DES DONNÉES PAR MILLIONS !
Trop ou pas assez pour l'élevage de demain ?

Programmes H2020 — Feed-a-Gene — SAPHIR — HORIZON 2020

Feed-a-Gene : adapter l'aliment, l'animal et les techniques d'alimentation pour améliorer l'efficacité et la durabilité des systèmes d'élevage de monogastriques
Jaap van Milgen, Inra Bretagne-Normandie

Saphir : renforcer les productions animales et la santé par la réponse immunitaire
Marie-Hélène Pinard-van der Laan, Inra Île-de-France-Jouy-en-Josas

Utiliser des données innovantes et personnalisées pour une gestion intégrée de la santé dans les élevages
Marie-Hélène Pinard-van der Laan, Inra Île-de-France-Jouy-en-Josas

À la recherche de nouvelles méthodes et données pour évaluer l'efficacité alimentaire chez le porc
Étienne Labussière et David Renaudeau, Inra Bretagne-Normandie

Élevage et alimentation de précision : une valeur à créer par la collecte et la maîtrise des données
Ludovic Brossard et Charlotte Gaillard, Inra Bretagne-Normandie

Sur le stand Inra/Agrocampus Ouest, démonstration d'outils logiciels en alimentation de précision pour les porcs

Contact : communication-bretagne-normandie@inra.fr • **www.rennes.inra.fr**

AGRO CAMPUS OUEST

Stand B42 Hall 4

INRA SCIENCE & IMPACT

CETTE INVITATION NE TIENT PAS LIEU D'ENTRÉE AU SPACE

Feed-a-Gene

ifip

INRA
SCIENCE & IMPACT

Alimentation de précision pour les porcs charcutiers, comment ça marche ?

Démonstration d'un outil de pilotage

Sur le stand

- Mardi 11 septembre — **16h/17h30**
- Mercredi 12 septembre – **15h/18h**
- Jeudi 13 septembre — **15h/18h**
- Vendredi 14 septembre – **11h/13h**

WEDNESDAY

14 NOV

9.30H -13.00H

HEIDELBERG ROOM

ALSO VISIT US AT STAND 2F48

CONTACT:

EFFAB@EFFAB.INFO

SAPHIR and Feed-a-Gene have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633184 and 633531. The European Union cannot be held responsible for any use which maybe made of the information contained therein.

NOVEL TOOLS FOR HEALTHIER AND EFFICIENT LIVESTOCK: FROM RESEARCH TO APPLICATION

SEE YOU AT THE WORKSHOP!

Novel tools for healthier livestock in the SAPHIR project
Marie-Hélène Pinard - van der Laan, INRA, France

Novel tools for efficient livestock in the Feed-a-Gene project
Valérie Heuzé, Association Française de Zootechnie, France

Towards better control of Bovine Respiratory Syncytial Virus (BRSV) infection
Jean-Francois Valarcher, Swedish University of Agricultural Sciences, Sweden

Public private partnerships for development of veterinary vaccines in livestock systems
Camille Bellet, University of Liverpool, UK

Anticoccidial vaccination: using *Eimeria* to control *Eimeria*
Damer Blake, Royal Veterinary College, UK

Mycoplasma hyopneumoniae vaccination in pigs: where are we and where do we go?
Dominiek Maes, Ghent University, Belgium

Alternative feed ingredients and technologies for improved nutritive value of feed
Knud-Erik Bach Knudsen, Aarhus University, Denmark

New traits related to feed efficiency
Alfons Jansman, Wageningen University & Research, the Netherlands

Plenary discussion
Jan Venneman, CIM (Consultant/Interim Manager), the Netherlands

Eficiencia alimentaria en cunicultura: mejora e impacto sobre las explotaciones

Jornada técnica

CALDES DE MONTBUI, 10 de octubre de 2018

Presentación

La eficiencia alimentaria, normalmente medida como índice de conversión, es uno de los parámetros más importantes en la rentabilidad de las explotaciones cunícolas.

En la jornada se pretende orientar, informar y debatir sobre los factores que afectan a la eficiencia alimentaria, su importancia económica, los mecanismos para su estimación y los avances que se están realizando para su mejora.

La jornada concluye con una mesa redonda donde se tratarán aspectos prácticos de la medición de la eficiencia alimentaria en las explotaciones cunícolas.

La jornada está dirigida a cunicultores, veterinarios y técnicos del sector. Cuenta con la participación de investigadores del Instituto de Investigación y Tecnología Agroalimentaria (IRTA) y de la Universidad Politécnica de Valencia (UPV) y veterinarios de la Federación de Asociaciones de Cunicultores de Catalunya (FACC).

Programa

15.30 h **Inscripciones y entrega de documentación**

16.00 h **Presentación de la Jornada**
Dra. Raquel Quintanilla. Responsable del Programa de Genética y Mejora Animal (IRTA).

16.30 h **Principales factores que influyen sobre la eficiencia alimentaria**
Dr. Juan Pablo Sánchez. Programa de Genética y Mejora Animal (IRTA).

17.00 h **Factores nutricionales que afectan a la eficiencia alimentaria**
Dr. Juan José Pascual. Instituto de Ciencia y Tecnología Animal (UPV).

17.30 h **Medida e impacto económico de la eficiencia alimentaria**
Dra. Mariam Pascual. Programa de Genética y Mejora Animal (IRTA).

18.00 h **Pausa**

18.30 h **Selección para mejorar la eficiencia alimentaria**
Dra. Miriam Piles Rovira. Programa de Genética y Mejora Animal (IRTA).

19.00 h **Mesa redonda: La eficiencia alimentaria en la práctica**
Sr. Ricard Garriga Baraut. Veterinario de la Federación de Asociaciones de Cunicultores de Cataluña (FACC).
Modera: Dra. Mariam Pascual. Programa de de Genética y Mejora Animal (IRTA).

19.30 h **Cierre de la Jornada**

Organización

IRTA
RECERCA I TECNOLOGIA AGROALIMENTÀRIES

Lugar de realización

Auditorio Josep Tarragó.
Instituto de Investigación y Tecnología Agroalimentaria (IRTA)
Torre Marimón. C-59 km 12,1.

08140 CALDES DE MONTBUI

Colaboración

NANTA
HIPRA La Referència en Prevenció per a Salut Animal
GÓMEZ Y CRESPO
Feed-a-Gene
El proyecto Feed-a-Gene ha sido financiado por el programa H2020 bajo el acuerdo de subvención número 633531

Inscripciones

La jornada es gratuita pero hay que suscribirse a través del enlace:
https://goo.gl/forms/xo3EGLaTTUef4oir1

También se puede realizar la suscripción a través del Servicio de Preinscripción a Jornadas PATT del portal RuralCat:
ruralcat.gencat.cat/preinscripcionspatt

@ruralcat

Feed-a-Gene

Newsletter #4

June 2019

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

Editorial

Dear readers,

We are proud to present the fourth newsletter of the Feed-a-Gene project funded through the Horizon 2020 programme of the European Union. As our project is less than one year from its end, it has by now produced a large amount of results. This newsletter offers a comprehensive vision of the progress done during the last 12 months as it was presented during the 4th annual meeting held on 14-16 May 2019 in Budapest, Hungary.

The **final meeting of Feed-a-Gene** will take place in January 2020 in Rennes, France. This event will be the perfect opportunity for stakeholders to discover the results and technologies produced by Feed-a-Gene, and to be prepared to transform these outputs into working innovations. We certainly hope to see you in Rennes next year!

Jaap van Milgen (INRA)
Feed-a-Gene project coordinator

The Feed-a-Gene Project has received funding from the European Union's H2020 Programme under grant agreement no 633531

Fourth Feed-a-Gene Annual meeting

Budapest, Hungary

The fourth annual meeting of the Feed-a-Gene project took place on 14-16 May in Budapest, Hungary. It was organized by the staff of Kaposvár University, one of the project partners. The meeting was attended by 56 people.

The fourth annual meeting of the Feed-a-Gene programme was organized by Kaposvár University in Budapest. During this meeting, Feed-a-Gene partners presented the work done so far, shared their results and planned activities for the next year. All attendees appreciated the organization of the meeting by Veronika Halas and her team at Kaposvár University .

Feed-a-Gene project coordinator Jaap van Milgen and project manager Vincent Troillard would like to thank all the people at Kaposvár University who made this meeting possible and enjoyable.

A year of results

During the meeting, researchers presented 21 oral communications, more than twice the number presented in the last annual meeting. Feed-a-Gene has produced about 200 publications, including more than 20 peer-reviewed papers, and public deliverables that are now available on-line. A progress report is provided in pages 6-12.

Feed-a-Gene is now entering its last year and all the work packages are producing results. Some of those results, such as precision feeding systems and decision support tools are in the demonstration phase and in some cases in the preindustrial phase.

Dr. Nicolas Friggens (INRA AgroParisTech) presented SmartCow, (www.smartcow.eu) a H2020 European project (2018-202) that integrates key European cattle research infrastructures to promote their use and development and thereby help the European cattle sector face the challenge of sustainable production. Covering all the relevant scientific fields and the diversity of cattle types and production systems, SmartCow will provide the research communities with easy access to 11 major research infrastructures from 7 countries, in order to develop innovative and ethical solutions for efficient use of animal and feed resources that promote animal welfare and healthy livestock, as well as sustainable competitiveness.

Ontologies for livestock: a tool for knowledge sharing and phenotypic data exploitation

Linh Chi Nguyen and Catherine Hurtaud (INRA) presented the concept of ontology. An ontology is a formal way of representing knowledge in which concepts in a particular field of knowledge are described both by their meaning and their relationship to each other. Of particular interest for Feed-a-Gene is ATOL (Animal Trait Ontology for Livestock, www.atol-ontology.com), a multi-species and multi-disciplinary ontology of characteristics defining phenotypes of livestock in their environment that is developed and maintained by INRA.

From top to bottom, left to right:

- Galina Dukhta (KU)
- Jaap van Milgen (INRA)
- Hélène Gilbert (INRA)
- Sandrine Espagnol (IFIP)
- Jesús Pomar (UdL)
- Veronika Halas (KU)
- Feed-a-Gene Annual meeting in Budapest
- Linh Chi Nguyen and Catherine Hurtaud (INRA)

Joint Feed-a-Gene/SAPHIR stakeholder sessions

Three joint Feed-a-Gene/SAPHIR meetings took place in 2018. Those meetings were an occasion for researchers and stakeholders working in animal genetics, nutrition and health to discuss and share perspectives.

Multidisciplinary approaches for improving sustainable livestock production

This stakeholder session was held on 30 August 2018 at the EAAP annual meeting in Dubrovnik, Croatia. Its objective was to address and discuss the challenges and opportunities in multidisciplinary research in livestock production. As there is no "one-size-fits-all" solution, how can different actors and stakeholders make collectively best use of disciplinary knowledge and levers to make livestock production more sustainable? This session was attended by about 150 people. It featured 18 communications and two discussion panels, one about research needs and one about stakeholders needs. The videos of the Feed-a-Gene communications and of the panel discussions can be watched on the Feed-a-Gene's YouTube channel.

Millions of data! Too many or too few for livestock farms of tomorrow

This stakeholder session was held in French on 11 September 2018 in Rennes, France, during the SPACE Agricultural Trade Show. Attended by 100 people, most of them French stakeholders, it featured 5 communications by INRA researchers. Its objective was to discuss the use of "big data" to improve animal performance and animal health in livestock farms. The presentations are available on the Feed-a-Gene website.

Novel tools for healthier and efficient livestock: from research to application

This stakeholder session was held on 14 October 2018 in Hanover, Germany, during the EuroTier Trade Show. It featured 8 communications and a plenary session. The videos of the communications by K. E. Bach Knudsen (Aarhus University), A. Jansman (WUR), and V. Heuzé (AFZ) can be watched on the Feed-a-Gene's YouTube channel.

- EAAP: Jaap van Milgen and Marie-Hélène Pinard-van der Laan (INRA)
- EAAP: Camille Bellet (U. Liverpool), Marianne Cerf (INRA), Claire Rogel-Gaillard (INRA), Dominiek Maas (U. Ghent), Hieu Nguyen Ba (INRA), Mathilde Le Sciellour (INRA)
- SPACE: stakeholder session
- EuroTier: Feed-a-Gene / SAPHIR booth

Feed-a-Gene

FeedUtiliGene: a Decision Support System for monogastric livestock production systems

FeedUtiliGene was presented during a demonstration session held in Budapest on 11 October 2018.

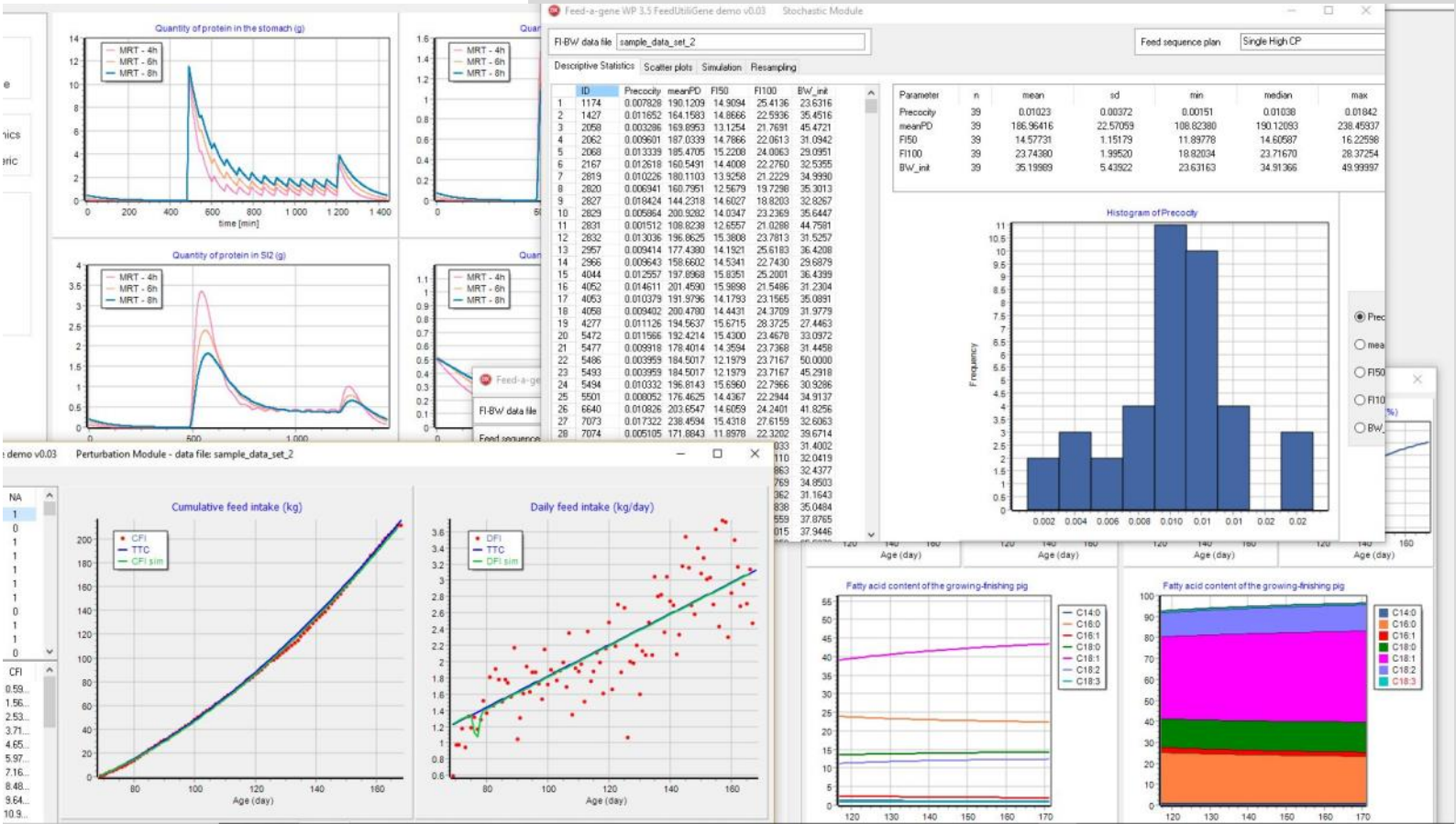
Developed for pigs and poultry, FeedUtiliGene integrates different models of:

- Digestion, digestibility of nutrients in feeds ingredients and diets
- Metabolic utilization and partitioning of nutrients
- Robustness of animals as a response to perturbations
- Individual variation

During the demonstration, the participants were able to install and test a preliminary version of the software and to interact with the researchers responsible for the creation of the biological models and of the software.

FeedUtiliGene is available upon request at: halas.veronika@ke.hu

Screenshots of FeedUtiliGene



Progress reports for the Feed-a-Gene project

Alternative feed ingredients and real-time characterisation (WP1)

WP leader: Knud Erik Bach Knudsen,
knuderik.bachknudsen@anis.au.dk

Production of novel feed protein from rapeseed and European grown soybeans

- A novel process for rapeseed meal improved detoxification and increased protein content from 44 to 53-57% of DM. Compared to a conventional process, desolventizing required similar energy but was less damaging to proteins.

Production of novel feed protein from green biomass

- In 2016-2017, the protein content of green biomass produced was lower than that of soybean meal, due to high ash content and inefficient protein precipitation.
- In 2017-2018, a better harvesting procedure and precipitation by heat rather than by fermentation increased protein concentration and quality.
- *In vitro* protein digestion of green biomass was comparable to or higher than that of soybean meal.
- Enzyme treatment during protein extraction enhanced hydrolysis in ryegrass and red clover.

Novel feed-processing technology to upgrade alternative feed ingredients

- The fine fraction of rapeseed meal resulting from fractionation was significantly richer in protein and contained less dietary fibre.
- No over-processing occurred during fractionation.

Green protein (AU)

Nutritional evaluation of novel feed ingredients

- In pigs, European soybean meals obtained by extrusion-pressing or flaking-cooking-pressing without dehulling have a higher standardized ileal digestibility (SID) of amino acids than a high-quality commercial meal.
- When using non-dehulled beans, SID of amino acids and protein is lower than for the control soybean meal, which may be attributed to a relatively high trypsin inhibitor activity.
- SID of green protein materials (rye grass, red clover and lucerne) was lower than that of soybean meal. The protein concentration and digestibility of protein needs to be improved to make it an attractive alternative source of protein for pigs.
- The fine fraction of rapeseed meal resulting from fractionation had higher energy and nutrient digestibilities and resulted in a significantly higher performance (daily weight gain, feed conversion ratio) without affecting the feed intake.
- The net energy of several protein sources (corn germ meal, corn gluten feed, solvent-extracted peanut meal, dehulled sunflower meal, soybean meal, expeller-pressed rapeseed meal, solvent-extracted rapeseed meal, canola meal, cottonseed meal) was determined by indirect calorimetry.

Improvements in nutritive value by use of novel enzymes

- In broilers, inclusion of rapeseed meal reduced performance during the growing period only. There were no effects of enzyme supplementation on performance or on digesta viscosity. Inclusion of proteases and NSPases resulted in lower DM digestibility at the end of the grower phase.
- In pigs, xylanase supplementation improved daily weight gain and feed intake, and increased nutrient and energy digestibilities. It increased the acetic acid concentration in the ileum and the caecum and decreased the concentration of the lactate, iso-butyric acid and n-pentanoic acid in the colon.

New methodologies for characterisation of nutrient composition and value

- Predictive calibrations for amino acids and protein have been tested for 791 feed samples. NIR predictions of amino acids are better than estimates from protein regression. Feed mixtures are the more difficult group to predict. Models offer good accuracy and are valid for a large range of sample types.
- Predictive models for *in vivo* and *in vitro* digestibilities have been developed and tested. For the digestibility of energy, the NIR prediction was better than a commonly used *in vitro* method.
- Processing of green protein and rapeseed meal affected the rate and/or maximum degree of protein hydrolysis but no substantial damage on lysine was observed.

Identification of feed efficiency traits related to individual diversity (WP2)

WP leader: Alfons Jansman
alfons.jansman@wur.nl

Individual feed intake and feeding behaviour in broilers and rabbits - New phenotypes to improve feed efficiency

- Data of body weight and feed intake of broilers at each visit of birds to the feeding station were collected. The algorithm of calculation of individual feed intake per visit has been established and is currently being adjusted.
- For rabbits, a device has been developed to measure individual feed intake in collective cages and is in use in further research. Traits related to feed efficiency are being studied and explored in relation to feeding behaviour.

Coarse (left) and fine (right) fractions of rapeseed meal (Bühler)

Broiler feeding station (INRA)

New traits and technologies for measuring and improving digestive efficiency and gut health in pigs, poultry and rabbits

- In piglets, dietary organic acids and essential oils could improve the gastrointestinal environment, including nutrient digestion, microbiota composition, and activity of digestive enzymes.
- In pigs, predictions of OM, DM, N and energy digestibilities from faecal NIRS spectra were excellent (R^2 from 86 to 90%).
- In pigs, 16S rRNA microbiota information failed to predict feed efficiency.
- In rabbits, caecal microbiota explains part of the phenotypic variance of performance traits, but prediction of animal performance did not improve when microbial data were included in the model.

Nutrient metabolism related traits to improve feed efficiency

- In pigs, birthweight and protein deposition potential both affected absolute retention of body protein in the grower phase. N efficiency is however only influenced by protein

deposition potential, not by birthweight.

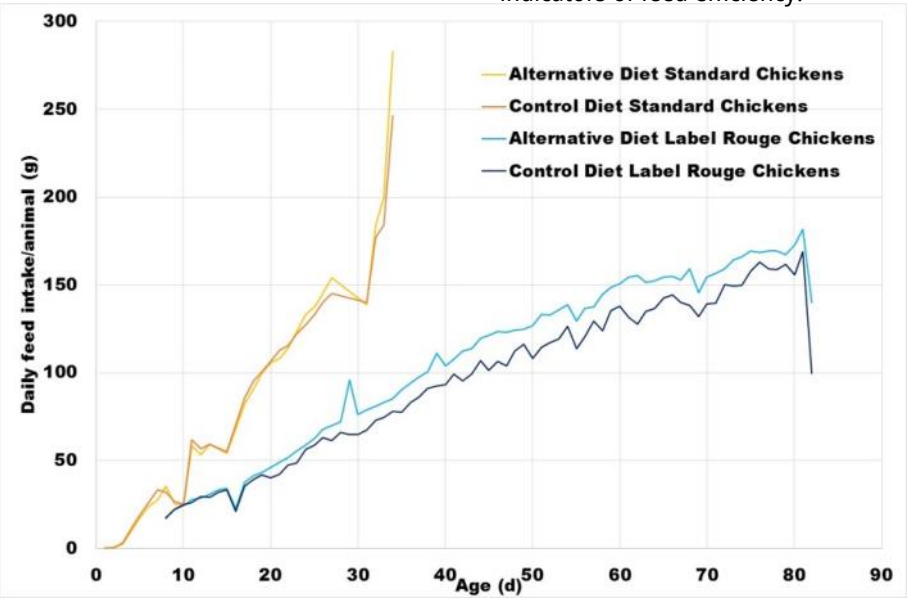
- Young pigs with a better performance and digestive efficiency had a lower protein turnover and lower fat incorporation rates compared to older pigs. Rates of both protein and fat differed between genotypes and seemed to depend on the dietary condition.
- Pigs with a higher growth performance had a lower amino acid turnover and less fat deposition in muscle and liver. Dietary protein level altered fat metabolism.
- Individuals with a low feed efficiency had a different fermentation profile, lower microbiota biodiversity, and showed an increase of *Bacteroidetes* and an higher *Bacteriodetes* / *Firmicutes* ratio.
- In piglets, predictive biomarkers for digestive efficiency (fermentation metabolites, diversity index in the caecal ecosystem, specific microbiota taxa) all correlated negatively with high digestive efficiency.

Behaviour and welfare related traits influencing feed efficiency

- Results point to a relatively low correlation between behavioural data and feed efficiency traits.
- Video recording associated to deep learning was able to track individual pigs in group-housed systems with good precision. 3D cameras could obtain reliable estimates of sitting/ standing behaviour.

Metabolomics to identify new traits for improvement of feed efficiency

- In pigs, urine analysis made it possible to discriminate between dietary protein regimes and between breeding value for protein deposition. Several metabolites were responsible for the separation of low and high protein deposition.
- In chickens, the ileal, caecal, and serum metabolome explained a large part of the variability of digestive efficiency. Absorbance of serum at 492 nm is strongly correlated to digestive efficiency.
- In pigs, blood biomarkers measured at an early stage were good indicators of feed efficiency.



Age vs. daily feed intake in standard and Label Rouge broilers fed standard or alternative diets (INRA)

Modelling feed use mechanisms and animal response to nutrient supply and environmental challenges (WP3)

WP leader: Veronika Halas
veronika.halas@ke.hu

Digestive utilisation of feed and nutrients

- The digestive model now integrates a more detailed representation of the mechanisms of phosphorus and calcium digestibility, and is being included in the model developed in MATLAB.

Metabolic utilisation of feed and nutrients

- The pig model is able to design daily tailored feeds for precision feeding.
- The broiler model was used to evaluate different feeding strategies.
- The first version of the layer model predicts the effect of the digestible nutrient supply, including energy, amino acids, Ca and P, on egg production, and it estimates the SID amino acid, digestible Ca and P requirement of laying hens.

Accounting for environmental variability, system disturbance and robustness

- Applying the perturbation model to mycotoxin data indicate that the procedure can detect precisely the period when pigs were perturbed by mycotoxins.

Accounting for variation among individuals in nutrient digestion and metabolism processes

- A new modelling approach for characterising variability in egg production and sow reproductive performance was developed and tested. A general method was developed to relate feed intake and body weight and efficiency of feed utilisation over time using any specified time resolution.

Delivery of a Decision Support Tool

- A version of the FeedUtiliGene Decision Support Software (DSS) containing all models has been completed.
- This version was demonstrated during a dedicated workshop and was positively evaluated by the participants.

Management systems for precision feeding to increase resilience to fluctuating environments (WP4)

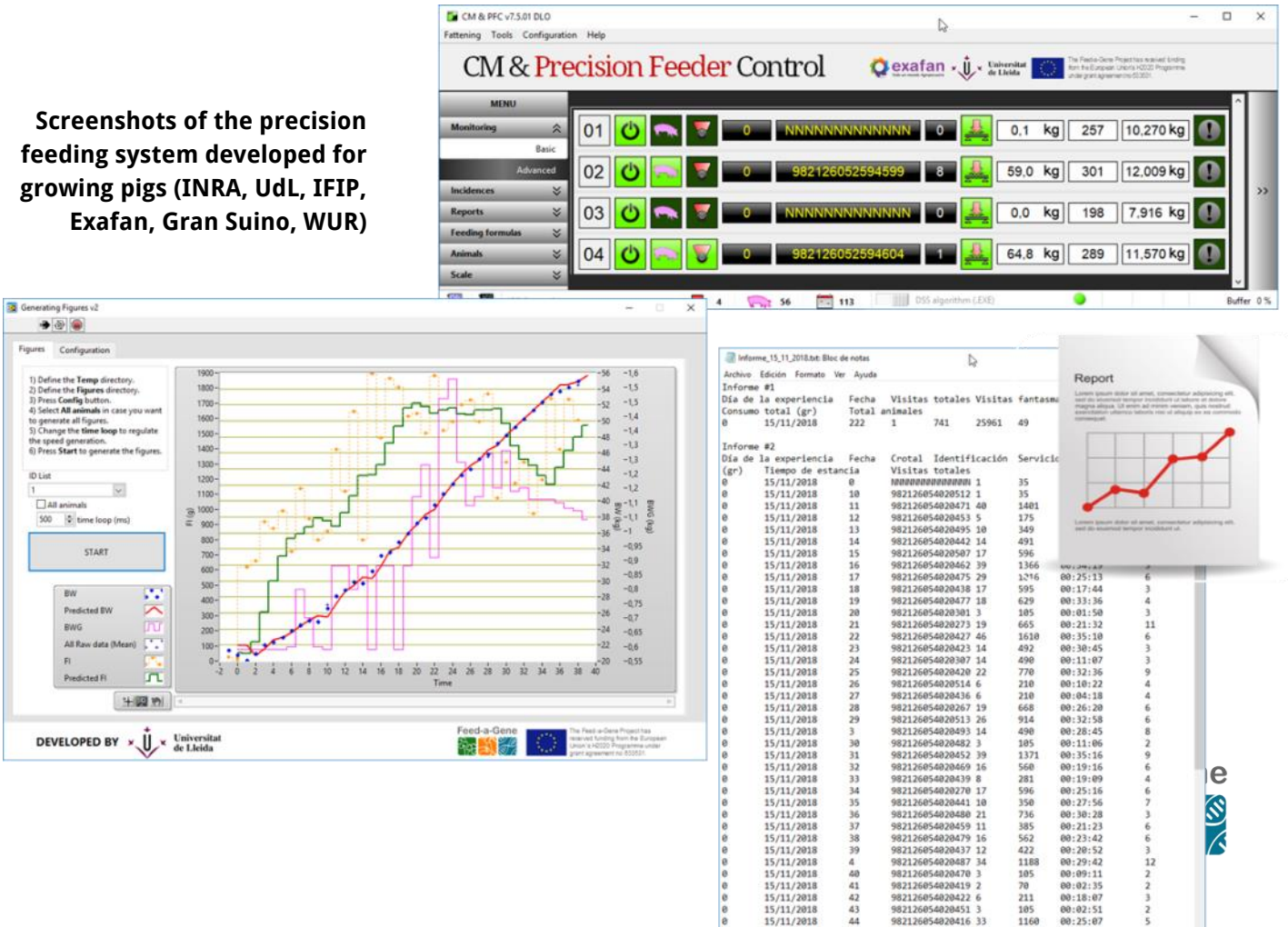
WP leader: Jesús Pomar
pomar@eagrof.udl.es

Building and validation of precision feeding system prototypes

- For growing pigs, the functional integration of the precision feeders and DSS was accomplished and some improvements were proposed.
- The pre-commercial precision feeding system was delivered for demonstration purposes at a commercial farm in Italy and for validation purposes at WUR.
- The DSS was able to calculate the daily formulation for each animal in the farm. Preliminary results suggest that low birthweight pigs may benefit from precision feeding.
- In broilers, experimental results were used to validate the DSS (performance, body composition).
- A first model to estimate daily nutritional requirement for energy, proteins, calcium, and phosphorus in laying hens is now available.

Demonstration activities

- A precision feeding system for growing pigs fed *ad libitum* has been developed and installed in a commercial pig farm in the Parma region. The software prototype integrates the controlling module, data management, and the DSS.
- A room equipped with a precision feeder prototype for growing pigs under restricted feeding is ready in the IFIP facilities for demonstration purposes.



Screenshots of the precision feeding system developed for growing pigs (INRA, UdL, IFIP, Exafan, Gran Suino, WUR)

Installation of the precision feeding system in a farm in Parma

Use of new traits in animal selection (WP5)

WP leader: Hélène Gilbert
helene.gilbert@inra.fr

Genetics of components of feed efficiency and robustness indicators

- New traits for feed efficiency in growing animals (individual feed records, digestive efficiency, haematological measurements, serum absorbance) have moderate to high heritabilities and can be used for selection.
- In sows, feeding records had different heritabilities depending on the breed, and certainly on animal management.
- Differentially expressed genes after a challenge depended on the line of pigs, whereas genes were similar in layer lines.

Genetic relationships between the gut microbiota and feed efficiency

- Significant chromosomic regions were identified for individual growth, feed intake, and feed efficiency.
- The heritability estimates and significant signals detected for microbiota OTUs in pigs and rabbits validated a host control of fractions of the gut microbiota in rabbits, suggesting possible selection of some OTU abundance.

Statistical-genetic modelling of feed efficiency and robustness features

- Group measurements of feed efficiency were genetically uncorrelated with production traits. Response to selection on longitudinal ADG using indirect genetic effects showed different dynamics with time.
- Multitrait double hierarchical generalized linear models analyses suggested the existence of global robustness across traits. Prediction accuracies and biases were low for longitudinal records.

Selection strategies to account for crossbred and genomic data for a sustainable selection for feed efficiency

- When selection was placed on FCR itself, it decreased by 7.1%, from 2.52 to 2.34 (kg/kg). Other traits that reduced FCR were: dry matter digestibility, daily feed intake, average daily gain, eating time per day, nitrogen excreted, group daily feed intake, lesion counts, *Alloprevotella*, joint lesions, and growth rate with social effect.

Demonstration of the value of social interactions and crossbred information in selection to improve feed efficiency

- In pigs, breeding values for indirect genetic effects (social effects) have been accumulated for testing their relationships with feed efficiency and behaviour.
- In rabbits, promising heritability estimations were obtained, but it is too early to conclude about the response to selection.

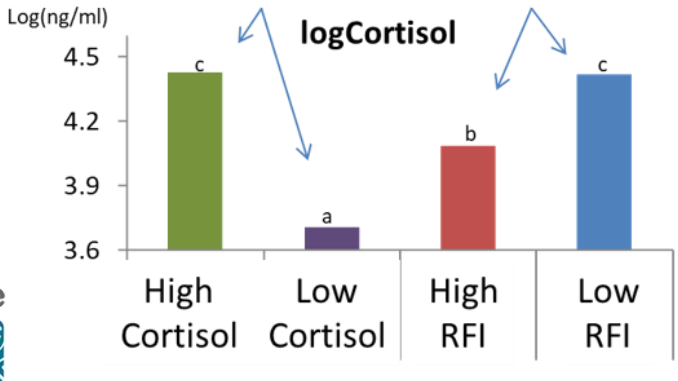
Sustainability assessment of production systems (WP6)

WP leader: Guy Garrod
guy.garrod@newcastle.ac.uk

Life Cycle Assessment of proposed management systems

- Two innovative feeding strategies were assessed: (1) the use of new European protein sources to replace Brazilian soybean meal associated with deforestation and (2) individual precision feeding strategies.
- Different formulation scenarios were defined to estimate the potential of using innovative feed

Cortisol levels of pig lines divergent for RFI (INRA)



Feed-a-Gene

ingredients to reduce the environmental impact of pig and broiler production.

- Feed formulation was carried out for all scenarios in conventional pigs using four price contexts in France, Netherlands, Germany, and Spain.
- 14 scenarios for broiler production were investigated. LCA for those scenarios was conducted.

On-farm evaluation of proposed management systems

- Preliminary results of baseline analysis for pig growing/finishing production have been obtained.

Evaluation of consumer and farmer attitudes

- A survey was designed to estimate values associated with the externality attributes of animal products, and to investigate the consumer acceptability of feed technologies. The survey was undertaken in the UK and Spain.
- An interview schedule was designed to investigate the attitudes of farmers in the UK and Spain to the introduction of novel feeding strategies.

Dissemination, training and technology transfer (WP7)

Stakeholder events

In addition to the 3 joint Feed-a-Gene/ SAPHIR meetings described previously, 3 other events were organized:

- Hands-on demonstration of the FeedUtiliGene DSS (Budapest, Hungary).
- Demonstration of the precision feeding system for growing pigs (SPACE, Rennes, France).
- Stakeholder workshop on feed efficiency in rabbits (Caldes de Montbui, Spain).

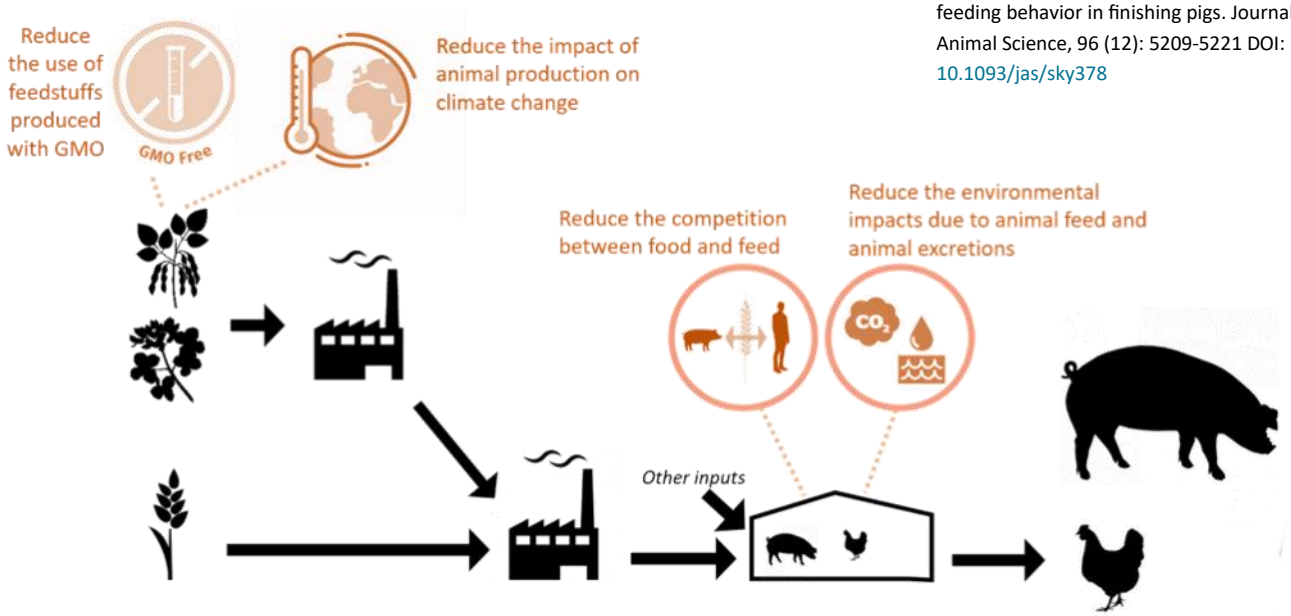
Other events

- Researchers participated in many other international and national events, including EPC (Croatia), JRP (France), Feed Additive Global (Netherlands), PSA Latin America (Brazil), PAGC (USA), ASESCU (Spain), Animal Microbiome Congress (Paris), PREGA (Hungart), DPC (Australia), AASV (Australia)

Publications

Feed-a-Gene researchers have made more than 150 publications, including 21 peer-reviewed papers. Here are the 14 papers published since May 2018.

- Formoso-Raferty N., Cervantes I., Sánchez J.P., Gutiérrez J.P., Bodin L., 2019. Effect of feed restriction on the environmental variability of birth weight in divergently selected lines of mice. Genetics Selection Evolution, 51: 27 DOI: 10.1186/s12711-019-0471-9
- Tusell L., Gilbert H., Vitezica Z.G., Mercat M.J., Legarra A., Larzul C., 2019. Dissecting total genetic variance into additive and dominance components of purebred and crossbred pig traits. Journal of Animal Science, 23 May 2019 DOI: 10.1017/S1751731119001046
- Piles M., Sánchez J.P., 2018. Using group records of feed intake to select for feed efficiency in rabbit. Journal of Animal Breeding and Genetics DOI: 10.1111/jbg.12395
- Garreau H., Ruesche J., Gilbert H., Balmisse E., Benitez F., Richard F., David I., Drouilhet L., Zemb O., 2018. Estimating direct genetic and maternal effects affecting rabbit growth and feed efficiency with a factorial design. Journal of Animal Breeding and Genetics, 2019, 00:1-6 DOI: 10.1111/jbg.12380
- Dukhta G., van Milgen J., Kövér G., Halas V., 2018. A growth model to predict body weight and body composition of broilers. Acta Agraria Debreceniensis, 75: 17-24
- Serviento A.M., Brossard L., Renaudeau D., 2018. An acute challenge with a deoxynivalenol-contaminated diet has short- and longterm effects on performance and feeding behavior in finishing pigs. Journal of Animal Science, 96 (12): 5209-5221 DOI: 10.1093/jas/sky378



Environmental challenges addressed in Feed-a-Gene

Feed-a-Gene

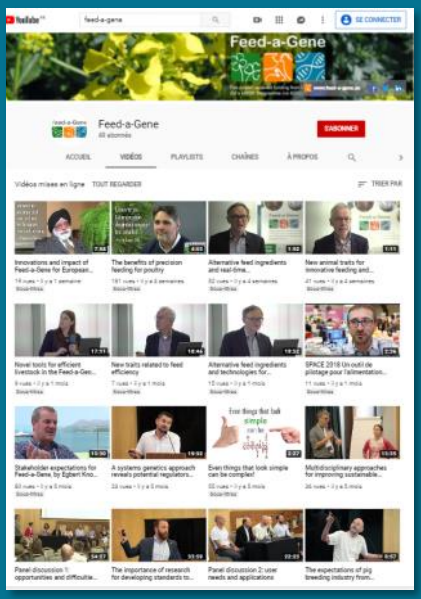
- Van Grevenhof E.M., Vandenplas J., Calus M.P.L., 2018. Genomic prediction for crossbred performance using metafounders. Journal of Animal Science DOI: 10.1093/jas/sky433
- Seradj A. R., Balcells J., Morazan H., Alvarez-Rodriguez J., Babot D., De la Fuente G., 2018. The impact of reducing dietary crude protein and increasing total dietary fiber on hindgut fermentation, the methanogen community and gas emission in growing pigs. Animal Feed Science and Technology, 245: 54-66 DOI: 10.1016/j.anifeedsci.2018.09.005
- Le Sciellour M., Labussière E., Zemb O., Renaudeau D., 2018. Effect of dietary fiber content on nutrient digestibility and fecal microbiota composition in growing-finishing pigs. PLOS One, 13 (10): e0206159 DOI: 10.1371/journal.pone.0206159
- Beauclercq S., Lefèvre A., Nadal-Desbarats L., Germain K., Praud C., Emond P., Le Bihan-Duval E., Mignon-Grasteau S., 2018. Does lipidomic serum analysis help in the assessment of digestive efficiency in chickens?. Poultry Science, 16 October 2018 DOI: 10.3382/ps/pey483
- Velasco-Galilea M., Piles M., Viñas M., Rafel O., González-Rodríguez O., Guivernau M., Sánchez, J.P., 2018. Rabbit microbiota changes throughout the intestinal tract. Frontiers in Microbiology, 13 September 2018 DOI: 10.3389/fmicb.2018.02144
- Tallentire C.W., Mackenzie S.G., Kyriazakis, I., 2018. Can novel ingredients replace soybeans and reduce the environmental burdens of European livestock systems in the future?. Journal of Cleaner Production, 187: 338-347 DOI: 10.1016/j.jclepro.2018.03.212
- Ragab M., Piles M., Quintanilla R., Sánchez J.P., 2018. Indirect genetic effect model using feeding behaviour traits to define the degree of interaction between mates: an implementation in pigs growth rate. Animal, 12 (7): 1-9 DOI: 10.1017/S1751731118001192
- David I., Sánchez J.P., Piles M., 2018. Longitudinal analysis of direct and indirect effects on the average daily gain in growing rabbits using a structured antedependence model. Genetics Selection Evolution, 50: 25 DOI: 10.1186/s12711-018-0395-9

Feed-a-Gene

YouTube

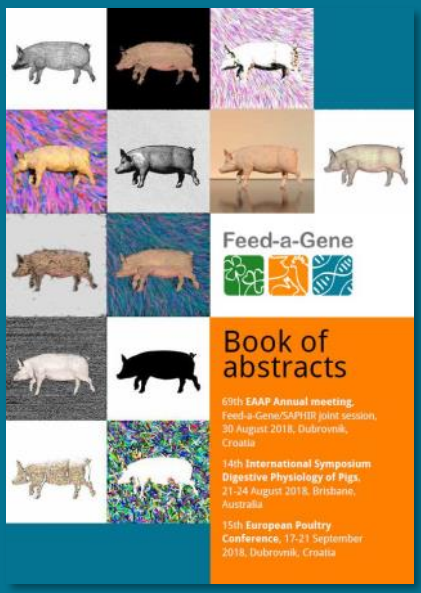
About 50 videos are now available on our YouTube channel

www.youtube.com/FeedageneEuProject



Download books of abstracts and about 200 communications, peer-reviewed papers and deliverables from the Feed-a-Gene website!

www.feed-a-gene.eu



Join Feed-a-Gene on social media!

www.facebook/feedagene

twitter.com/FeedaGene

www.linkedin.com/company/feed-a-gene

www.youtube.com/FeedageneEuProject

www.researchgate.net/project/Feed-a-Gene-3

SAB recommendations: focus on reaching stakeholders and policy makers

The stakeholder advisory board (SAB) praised the project for its management, the positive attitude of its research teams and its promising results.

- Its main recommendation is to focus on creating and delivering communication material that will integrate seamlessly the results of the different work packages. The messages should be tailored to specific groups of stakeholders.
- For stakeholders including farmers and industry: factsheets, practice abstracts, articles for trade magazines, webinars, press releases.
- For policy makers: policy briefs. Some policy briefs could focus on recommendations for follow-up activities (Innovation Actions) and research projects (Research and Innovation Actions, FP9).

SAB members: Jan Venneman (EFFAB), Harinder Makkar

Upcoming conferences

Feed-a-Gene researchers will present communications in the following conferences in 2019.

ISAG 2019

37th International Society for Animal Genetics Conference, 7-12 July 2019, Lleida, Spain

ASAS-CSAS 2019

Annual meeting & Trade show, 8-11 July 2019, Austin Convention Center, Austin, Texas, USA

70th EAAP Annual meeting

70th Annual Meeting of the European Federation of Animal Science, 26-30 August 2019, Ghent, Belgium

ISEP 2019

6th International Symposium on Energy and Protein Metabolism and Nutrition, 9-12 September 2019, Belo Horizonte, Minas Gerais, Brazil

MODNUT 2019

9th Workshop on Modelling Nutrient Digestion and Utilization in Farm Animals, 14-16 September 2019, Ubatuba, Brazil

WIANF

3rd World Conference on Innovative Animal Nutrition and Feeding, 9-11 October 2019, Central European University, Budapest, Hungary

ESPG 2019

11th European symposium on Poultry Genetics, 23–25 October 2019, Prague, Czech Republic

AAABG 2019

Association for the Advancement of Animal Breeding and Genetics, 27 October - 1 November 2019, University of New England, Armidale, NSW, Australia,

Feed-a-Gene

Future Feed-a-Gene events

- On-farm demonstration of precision feeding for pigs: open days for farmers and extension services, Mid-2019, Parma region, Italy
- Protein autonomy, more and better: presentation of new feeds and feed processing technologies, October 2019, FEFAC annual meeting, Denmark
- Meeting with policy makers, 6th November 2019, Brussels, Belgium, Animal Task Force meeting

Feed-a-Gene final meeting

January 2020, Rennes, France

During this event, stakeholders will be able to interact with Feed-a-Gene researchers

- Presentation of the results and technologies developed through the Feed-a-Gene programme
- Live demonstrations: decision support tools, precision feeders
- Workshops: "From Feed-a-Gene results to innovation" on applicability and exploitation of Feed-a-Gene results

Registration will be open soon!

Feed-a-Gene Newsletter #4
June 2019

Photo credits

Pages 1: Patrick Carré (OLEAD). 2-5: Gilles Tran (AFZ) & Valérie Heuzé (AFZ). 6: Helle Nygaard Lærke (AU). 7: INRA Tours; Bülher. 10: Exafan. 13: Gilles Tran (AFZ). 14: Edouard Hue; Valérie Heuzé (AFZ)

Conception and design

Association française de zootechnie

Feed-a-Gene

The unique Feed-a-Gene tie!

www.feed-a-gene.eu