

EUROPEAN VETERINARY RESEARCH: FROM THE SEVENTH FRAMEWORK PROGRAMME OF THE EUROPEAN COMMUNITY FOR RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION ACTIVITIES, TO HORIZON 2020

RECHERCHE VÉTÉRINAIRE EUROPÉENNE : DU SEPTIÈME PROGRAMME CADRE DE LA COMMUNAUTÉ EUROPÉENNE POUR DES ACTIONS DE RECHERCHE, DE DÉVELOPPEMENT TECHNOLOGIQUE ET DE DÉMONSTRATION, À HORIZON 2020

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ABSTRACT

The perimeter of "veterinary sciences" is difficult to circumscribe. Besides the core business, i.e. health of (terrestrial) animals and food safety, many other associated fields do not concern only the veterinary profession: zootechnics including animal welfare, nutrition, genetics; aquaculture etc. The successive European Framework Programmes have regularly financed veterinary research activities, in particular the health of livestock and food safety; but also many associated areas, notably since the 7th Framework Program (period 2007-2013). The budget for the European Framework Programme is estimated to represent no more than 5 to 10% of research and development expenditure in Europe, and this is probably the case in the field of animal health. Nevertheless, the Framework Programmes have become an important means of coordination of research programmes in Europe contributing in particular to the construction of the "European Research Area". Intra-European transnational co-publications in the veterinary field/animal health/animal welfare are a minority of the publications of the European countries but are proportionally more frequent than co-publications on the American or Asian continents. The French entities are present on the veterinary research landscape, be it European or global, but could probably be improved. With Horizon 2020, the emphasis placed on societal challenges and innovation in particular, often requires a multi-disciplinary, multi-actor approach, in which animal health, and beyond livestock production, are often integrated into broader issues such food security and nutrition, the sustainability of agriculture, or the bioeconomy. International cooperation beyond Europe may be crucial for addressing societal challenges that are often common to the world. This is especially true for infectious animal diseases. Topics - recent research projects, relevant to veterinarians, illustrate this approach of Horizon 2020.

Key words: European Framework Programme for Research, Horizon 2020, scientific cooperation, veterinary science, animal health, food safety, livestock production, societal challenge.

Glossary / glossaire

ERA: European Research Area

ERC: European Research Council

FP: Framework Programme

GBAORD: Government Budget Appropriations or Outlays on R&D

JPI: Joint Programming Initiative

JTI: Joint Technology Initiative

MSCA: Marie Skłodowska-Curie Actions

P2P: Public-Public Partnership

PPP: Public-Private Partnership

R&D: Research and Development

SC: Societal Challenge under Horizon 2020

SME: Small and Medium Enterprise/JTI

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RÉSUMÉ

Il n'est pas aisé de circonscrire le périmètre des sciences vétérinaires. À côté du cœur de métier, la santé des animaux (terrestres) et la sécurité des aliments, de multiples autres domaines associés ne concernent pas que la profession vétérinaire : zootechnie y compris bien-être animal, nutrition, génétique; aquaculture etc. Les programmes cadres européens de recherche successifs ont régulièrement financé les activités de recherche « vétérinaire », plus particulièrement la santé des animaux de rente et la sécurité des aliments ; mais aussi de nombreux domaines associés, et ce notamment depuis le 7^{ème} Programme Cadre (période 2007-2013). On estime que le budget du programme cadre européen ne représente pas plus de 5 à 10% des dépenses en recherche et développement en Europe, et c'est probablement le cas dans le domaine de la santé animale. Néanmoins, les Programmes Cadres sont devenus un moyen important de coordination des programmes de recherche en Europe, contribuant notamment à construire « l'Espace Européen de la Recherche ». Les co-publications transnationales intra-européennes dans le domaine vétérinaire/santé animale/bien-être animal représentent une minorité des publications des pays européens, mais sont proportionnellement plus fréquentes que les co-publications dans les continents Américain ou Asiatique. Les entités françaises sont présentes sur la scène de la recherche vétérinaire européenne ou mondiale, mais leur proportion pourrait sans doute être améliorée. Avec Horizon 2020, l'accent mis sur les défis de société et l'innovation notamment, demande souvent une approche multi-disciplinaire, multi-acteurs, dans laquelle la santé animale, et au-delà l'élevage, sont souvent intégrés dans des problématiques plus larges telles que la sécurité alimentaire et la nutrition, la durabilité de l'agriculture, ou la bio-économie. La coopération internationale au-delà de l'Europe peut-être cruciale pour relever des défis sociétaux qui sont bien souvent communs au monde entier. C'est d'autant plus vrai pour les maladies infectieuses animales. Des sujets - projets de recherche récents, pertinents pour les vétérinaires, illustrent cette approche d'Horizon2020.

Mots-clés : Programme Cadre Européen de Recherche, Horizon 2020, coopération scientifique, science vétérinaire, santé animale, sécurité des aliments, productions animales, défis de société.

INTRODUCTION

The European Union is now implementing Horizon 2020, the 8th Framework Programme for Research and Innovation. It is expected that it will lead to more breakthroughs and discoveries by taking great ideas from the laboratory to the market. The present paper will look back at the recent history and assess the main features of European veterinary research in the last decade, how it compares to other regions in the world and what the situation of France in that landscape is. The main objectives and features of Horizon 2020 will be presented, together with challenges faced by the livestock production sector, including veterinary sciences. Examples of H2020 research projects, topics and initiatives will be provided to illustrate the evolving trend in Europe funded veterinary research.

SETTING THE SCENE: HORIZON 2020 & EUROPEAN RESEARCH AREA

Horizon 2020 is the biggest EU research and innovation programme ever set up. Some €77 billion of funding is available over 7 years (2014 to 2020) – in addition to the private and national public investment that this money will attract. In comparison, the 7th Framework Programme (FP7) had a financial commitment of €55.8 billion for a similar 7 year period (2007-2013).

The three pillars of Horizon 2020

The 'Excellent science' pillar has 4 main components: i) Frontier research funded by the European Research Council (ERC), ii) Marie Skłodowska-Curie Actions (MSCA), iii) Future and emerging technologies, iv) World-class infrastructure. The second pillar is the industrial leadership. Innovation in SMEs and access to risk finance are part of this pillar. The EU needs to encourage businesses to invest more in research, and target areas where they can work with the public sector to boost innovation. Joint Technology Initiatives, initiated under FP7, are Public-Private partnerships (PPP) involving industry, the research community and public authorities, which support large-scale multinational research activities in areas of major interest to European industrial competitiveness and issues of high societal relevance, like it is with the Innovative Medicines Initiatives in the Health domain [1] The third pillar is addressing societal challenges (SCs). The EU has identified seven priority challenges where targeted investment in research and innovation can have a real impact benefitting the citizen. EU collaborative projects on veterinary sciences are mostly funded under Societal Challenge 2 Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy.

European Research Area (ERA) transnational cooperation and Programme co-fund

ERA is a unified research area open to the world, based on the internal market, in which researchers, scientific knowledge and technology circulate freely and through which the Union and its Member States strengthen their scientific and technological bases.

Through the ERA-NET scheme, the Commission provides financial support from the framework programme by co-funding calls (in collaboration with the national funding agencies) and other joint activities related to the coordination of national/regional R&D programmes. A new funding instrument under Horizon 2020 is the "European Joint Programme" co-fund action, which aims to strengthen alignment of research (joint activities or other integrating activities) among consortia of research programme managers/owners and allows partnership with private research entities. Joint Programming Initiatives (JPI) are public-public partnerships (P2P) that aim to pool national research efforts to tackle common European challenges. Two JPIs are most relevant to veterinary research: the JPI on Agriculture, Food Security and Climate Change: FACCE-JPI [2] brings together 22 countries who are committed to building an integrated European Research Area and the JPI on anti-microbial resistance: JPI-AMR [3]. According to the results of the ERA survey 2014, the average share of funding dedicated to joint research agendas among the funders which answered the survey is only 1.42% of their R&D budgets (**figure 1**). Differences in share of budget allocated to transnational cooperation are very important. This percentage can be considered as low, but coordination of programmes goes beyond budgetary aspects.

The budget of the European framework programme

The budget for the European Framework Programme is estimated to represent no more than 5 to 10% of (public) research and development expenditure in Europe. This ratio is certainly valid for agriculture research, where the total EU GBAORD is

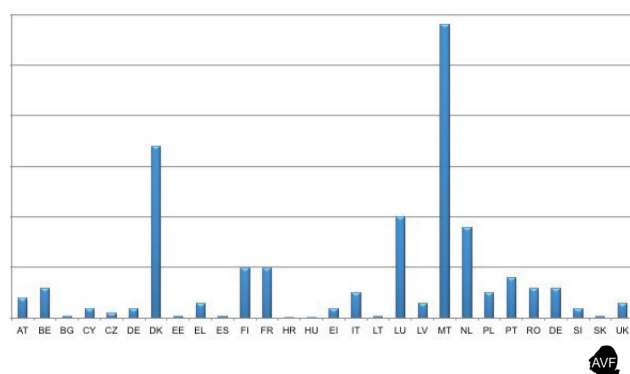


Figure 1: Share of funders R&D budget dedicated to joint defined research agendas with non national funders (2013) Source: ERA survey 2014.

around 3 to 3.5 billion euros per year (**figure 2**), while the budget SC2 (covering much more than agriculture) for the 7 year period of Horizon 2020 is 3.7 billion euros. This ratio is probably relevant also in the field of animal health, where EU funding has been on average around €15-20 million per year in the past Framework Programme (FP7), when Member States are estimated to have cumulative budgets above €300 million per year (conservative estimate based on unpublished data collected from STAR-IDAZ project- on commitments of 15 Member States for 2006).

BIBLIOMETRIC ANALYSES OF VETERINARY RESEARCH WITH EMPHASIS ON TRANSNATIONAL COLLABORATIONS

This paper makes use of three bibliometric analyses of veterinary related research to give a picture of the European situation, with a particular focus on France, considering also the global landscape:

Bibliometric analysis of French veterinary research 2003-2007 [4]

Between 2003 and 2007, there was a 55% increase in the number of publications globally (42308 references from WoS), i.e. over 10% per year on average. The increase was lower in France (35%). With 5,20 %, France ranked fifth in the world for the publication of articles of impact-factor journals, after the United States (22,72%), England and Scotland (10,96%), Germany (5,71%) and Brazil (5,58%). From an EU perspective, it is interesting to note that there were 6 Member States among the top 10 countries, and 10 among the top 20 countries. The rank of China, 20th with 1,17 %, was very low at that period. The main countries with which French authors associate were: United States (9,31%), England (5,37%), Germany (4,57%), Belgium (4,16%), Italy (3,50%) and Spain (3,09%). All other countries were below 3%.

By working on a bibliographic repository made up of the publications of French researchers in the veterinary sciences and based

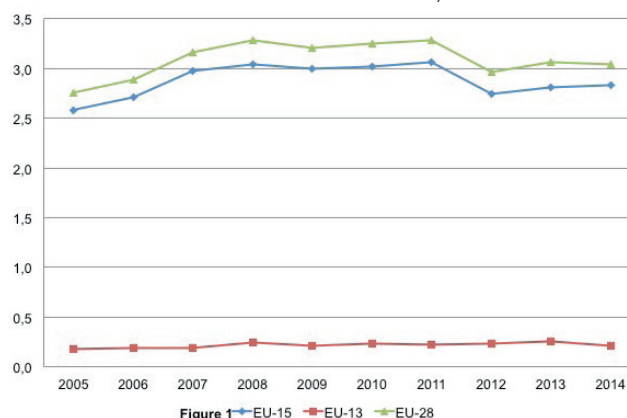


Figure 2: Evolution of GBAORD (Government Budget Appropriations or outlays on R&D) for agriculture in the EU, in billion euros. Source: Eurostat.

on the four main international bases selected, the study identified the main French institutions publishing in the sector. INRA was the first, Anses (Afssa at the time) 6th.

ANIHWA first report on mapped scientific data information in Animal Health and Animal Welfare (Europe) [5]

The database contained a total of 17419 publications from WoS for 2008-2011, showing an average annual increase of 3%. 91% of publications were on animal health, 7% on animal welfare and 2% on both. The distribution infectious diseases – non infectious diseases was 72%-28%. France was ranked 4th for infectious animal diseases (10%), after UK (22%), Germany (12%) and Spain (10%). It was ranked 3rd for non-infectious animal diseases (8%), after UK (19%) and Germany (14%), and 2nd for animal welfare (11%), after UK (26%).

In this study, INRA was the entity at the highest rank among French institutions as regards number of publications in the PubAnihwa database, being 3rd at European level for infectious animal diseases after BBSRC and DEFRA in UK; ANSES being 13th, 1st for non-infectious diseases and 2nd for animal welfare. A large majority of publications were intra national partnerships, with respectively 62% in infectious diseases, 67% for non-infectious diseases and 71% for animal welfare. The intra-European partnerships (involving at least two European countries, whether or not with non-European countries) were respectively 19% for infectious, 16% for non-infectious diseases and 19% for animal welfare, while 19%, 17% and 10% respectively were the output of extra-European partnerships. As regards animal welfare, while the production represents only ten per cent of the overall PubAnihwa database, there was a regular increase of the publications all along the studied period. Northern and western Europe were the areas producing the most on animal welfare issue but the gap with South of Europe was reducing over the last 4 years. The authors highlighted that international scientific openness of European countries stays generally low and concluded that European framework programmes in general and the ERA-Nets in particular should play an active role to promote and to increase international openness within Europe.

STAR-IDAZ report on bibliometric study (2006-2013) on animal infectious diseases [6]

STAR-IDAZ was an FP7 project on global strategic alliances for the coordination of research on the major infectious diseases of animals and zoonoses. The study was based on the updated above publication database which included papers from around the world published from 2006 through 2013 (8 year period). Details provided on research themes (animal species, pathogens) and geographical regions are available on the database online

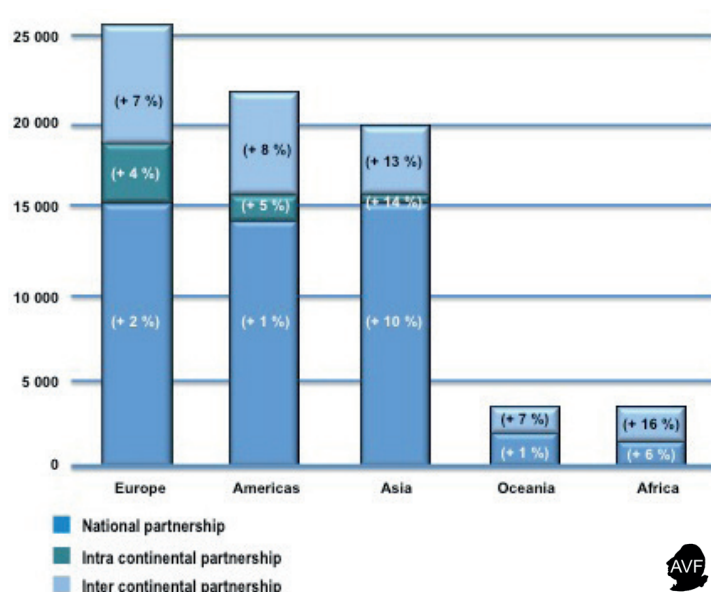


Figure 3: Distribution of authorship for each continent for the period 2006-2013 (in brackets, significant average annual growth rate, for the period 2006-2013). To affiliate an article with a continent, at least one author must be from that continent (continent defined by the United Nations). If an article has multiple authors from different continents, it may be affiliated with each of those continents, and thus be counted multiple times. Source: STAR-IDAZ report on bibliometric study (2006-2013) on animal infectious diseases. 2015, 90 p., Report (Ducrot C, Gautret M, Pineau T, Jestin A.).

on STAR-IDAZ website [7]. The final database contained 62 754 bibliographic references of WoS articles on animal health published around the world [8]. The number of papers published per year on infectious diseases in production animals increased regularly (with an average increase of 5% per year) and reached over 9 000 in 2013. The distribution of scientific papers among continents reveals three major groups: Europe, the Americas and Asia. As regards collaboration networks/co-authorship, 75% of the papers had co-authors from the same country and 25% showed international co-authorship (10% from different countries on the same continent, and in 15% from different continents). The number of papers with international collaboration is increasing more rapidly than the overall average growth.

If the trends showed in the STAR-IDAZ study would be maintained, projection by 2020 would give highest percentage of publications to Asia (42% against 27% for the period 2006-2013), 27% in Europe and 21% in Americas, and the remaining 10% for Africa and Oceania.

The distribution of authorship for each continent for the period 2006-2013 is shown in **figure 3**. The share of intra-country co-publications in Europe is around 60 %. The number and proportion of intra-continental partnership within Europe is much higher than it is in the Americas, Asia, the two other main producers. Could this at least partly be due to the EU efforts to foster transnational cooperation?

The graph (**figure 4**) shows a well-established network of international collaborations with different levels of volumes and inter-regional collaborations. European regions largely collaborate with each other as well as with North America.

The STAR-IDAZ database was also used to produce a comparable analysis focussing on France, for the same period 2006-2013, based on 2720 papers [8]. France was found to represent 4,3% of the world production, with an annual increase of 3%. France is very open to international cooperation on infectious animal diseases: according to Ducrot et al, only 38% of the papers have French co-authorship, while 28% are European co-authorships and 34% have co-authorship in the rest of the world.

RESEARCH RELEVANT TO VETERINARY SCIENCES FUNDED UNDER FP7, WITH EMPHASIS ON TRANSNATIONAL COLLABORATIONS

Theme 2 of FP7 “Food, agriculture and fisheries, and biotechnologies” was divided into 3 activities, two of which are relevant to livestock and veterinary sciences. Under activity 2.1 “Sustainable production and management of biological resources from land, forest, and aquatic environments”, slightly more than 200 million euros were spent on livestock research. Out of this amount, around 60% went into animal health, animal welfare, pre-harvest food safety. In addition in “Fork to farm, food, including seafood, health and well-being” (Activity .2.2), 100 million euros were spent on food quality and safety. It is clear from the structure of FP7, and this is valid as well for Horizon 2020, that while support to policy is an important component of EU funded research, many other objectives are equally important. For instance as regards animal health, diseases subject to EU legislation had a significant focus, but non-regulated diseases were tackled, still mostly on infectious diseases and related issues. Embedding veterinary sciences in Theme 2 of FP7 resulted in focussing mostly on production animals (terrestrial; aquatic; honeybees). Companion animals and most of wildlife were addressed under Theme 2 (same situation prevailing in Horizon 2020) in so far as they play a role in livestock disease epidemiology, are reservoirs of zoonotic agents or are models for animal diseases or for comparative genetics purposes. An example of this is CALLISTO project on companion animals [9]. Research on companion animals was also performed outside Theme 2, essentially when they are models for humans, e.g. genetic, metabolic disorders. LUPA project funded under Theme 1 (“Health”) is another example on using the dog as a model system funded [10] or K9GENES on “Mapping canine genes and pathways to leverage personalized treatment options”, an ERC grant.

The average EU contribution per project in Theme 2 was slightly above 3 million euros, the typical size of a medium scale collaborative project. While some coordination actions had lower contribution, large scale collaborative projects

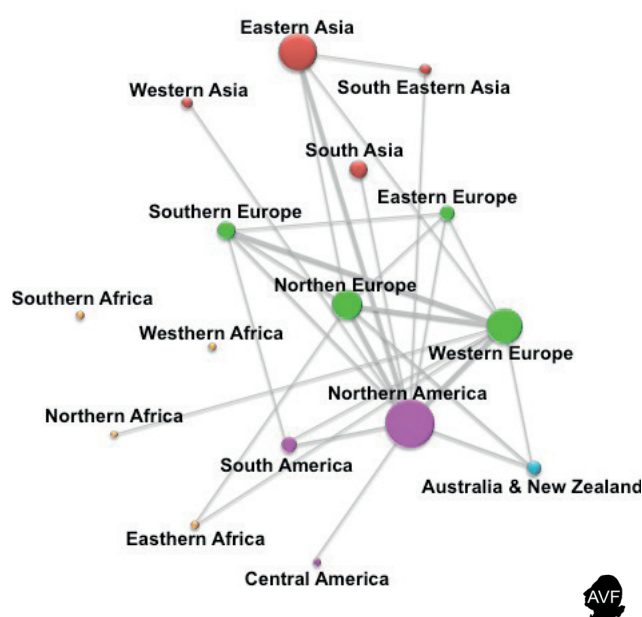


Figure 4: Co-authorship network of publications between geographical regions for the period 2006-2013 (Data base = 62 754 articles; Node threshold = 400 publications; Edge threshold = 200 co-publications). Geographical regions are defined by the United Nations. Source: STAR-IDAZ report on bibliometric study (2006-2013) on animal infectious diseases. 2015, 90 p., Report (Ducrot C., Gautret M., Pineau T., Jestin A.).

received up to 9 million euros. This is quite bigger than most national projects, or focussed projects selected in the ERA-NET joint calls. The average EU contribution is increasing under Horizon 2020 Societal Challenges. Nevertheless, these contributions were not as big as under FP6, with often above 10 million euros for integrated projects and networks of excellence. In this paper we assess portfolios of projects funded under Theme 2 and Theme 1, with an emphasis on French participation but to illustrate the diversity of funding opportunities for veterinary relevant research, examples of FP7 research projects funded in other parts than Theme 1 and Theme 2 are provided below.

Some projects focussed on SMEs addressed issues related to creation or improvement of tools : “Pheromone-based sensor system for detecting oestrus in dairy cows [11], “Demonstration of results leading to novel, validated diagnostic tests for active human and bovine tuberculosis”[12]), “Hormone-free non-seasonal or seasonal goat reproduction for a sustainable European goat-milk market” [13], “Genomic tools for breeding against heritable diseases in horses” [14], some of which have French participation.

FP7 ERC (European Research Council) funded more academic research projects such as DAMONA project on “Mutation and Recombination in the Cattle Germline: Genomic Analysis and Impact on Fertility”), and HELIVAC (“Overpowering helminth-mediated immune-modulation is a route towards vaccine development against these major animal pathogens”).

Another important part of the framework programme is ‘infrastructures’. One EU ‘infrastructure’ project was focussed on livestock and veterinary sciences, funded under FP7: NADIR “The Network of Animal Disease Infectiology Research Facilities” [15]. Another EU infrastructure projects had potential relevance to veterinary sciences like ELIXIR “European Life-science Infrastructure for Biological Information” [16], MIRRI “Microbial Resource Research Infrastructure” [17] and TRANSVAC “European Network of Vaccine Development and Research” [18]. Some H2020 projects are a follow up of FP7 project, such as EVA that is going global EVAg, with Université d’Aix Marseille as coordinator and INSERM, Pasteur Institute and Fondation Mérieux as other French members [19].

In addition, COST funded actions relevant to veterinary sciences, such as Bacfoodnet: “A European Network For Mitigating Bacterial Colonisation and Persistence On Foods and Food Processing Environments” [20]; “Towards Control of Avian Coronaviruses: Strategies for Diagnosis, Surveillance and Vaccination”, with INRA and ANSES as partners [21]; and Methagene “Large-scale methane measurements on individual ruminants for genetic evaluations” with INRA and Institut de l’élevage as partners among the French participants [22]; NEOH “network for evaluation of One Health” [23]; “understanding and combating African Swine Fever in Europe”, ANSES and CIRAD are partners among the French participants) [24].

The CORDIS database enables to search for details and public reports of EU funded projects [25].

Breakdown of 435 EU participations per country

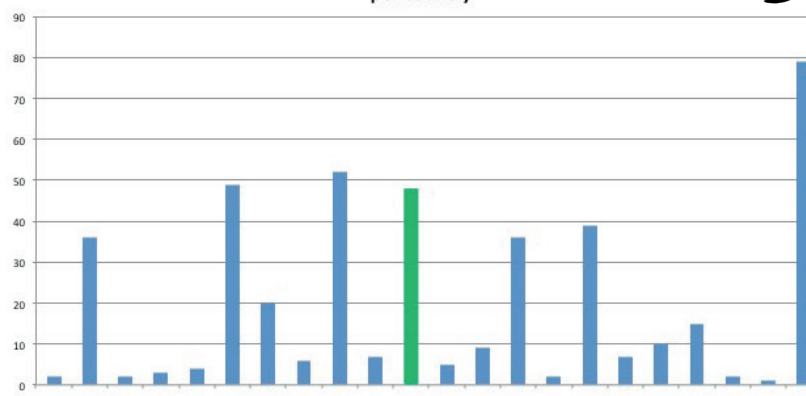


Figure 5: FP7 – 35 SC2 projects on infectious diseases, including zoonoses, foodborne infections, AMR, production diseases and structuring projects. Breakdown per country of 435 participations of EU Member States.

FP7 research projects under Theme 2 (Agriculture, Food)

Research projects on core business of the veterinary profession:

In this group 35 projects were on: infectious diseases, including zoonoses, foodborne infections, AMR, production diseases and structuring projects (e.g. ERA-NETs). The projects addressed surveillance and networking, epidemic diseases (in particular Foot-and-mouth disease, Classical swine fever, African swine fever, orbiviruses), endemic diseases (mycobacterial diseases, parasites, tick-borne diseases, porcine circovirus diseases, porcine reproductive and respiratory syndrome), Influenza (avian and swine), as well as a few structuring, coordinating projects. Among

the latter category are EMIDA and ANIHW ERA-NETs, STAR-IDAZ [26] network and DISCONTTOOLS [27]. DISCONTTOOLS, derived from European Technology Platform for Global Animal Health (ETPGAH) provided a mechanism for prioritising research on animal diseases to ultimately deliver new and improved vaccines, pharmaceuticals and diagnostic tests. Out of the 552 participants, 78% were EU participants. The participations among the 22 participating Members States is presented in **figure 5**: the top ranked country is UK (nearly 80 participations), followed by 3 countries with around 50 participations: Spain (52), Germany (49) and France (48). The breakdown of the participations among French entities is presented in **figure 6**: 3 entities dominate: ANSES is first with 11 participations, followed by CIRAD and INRA (both with 7 participations).

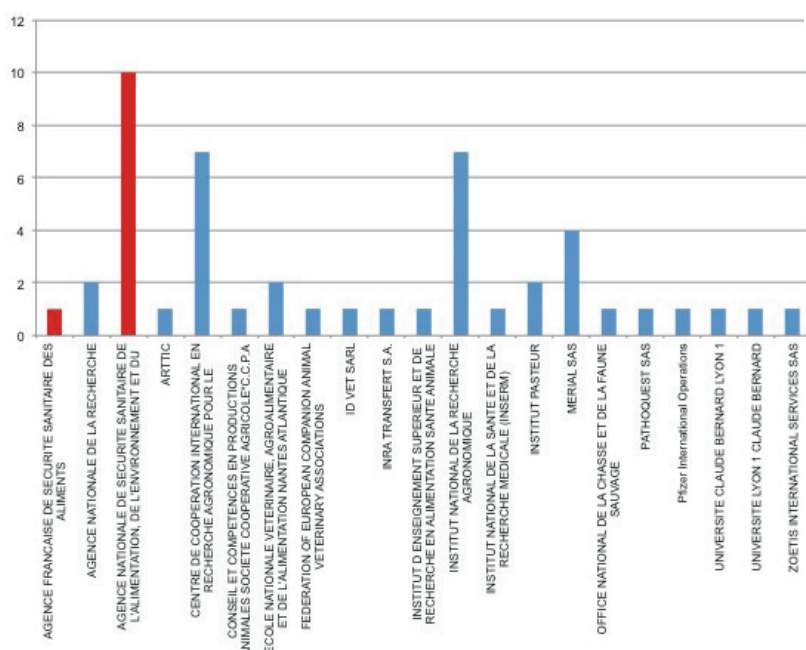


Figure 6: FP7 – 35 SC2 projects on infectious diseases, including zoonoses, foodborne infections, AMR, production diseases and structuring projects. Breakdown of 48 French participations, per entity.

Research projects where veterinarians are active together with other professions

In this group 35 projects were on domains relevant to veterinary sciences: food safety, husbandry, animal welfare, animal nutrition, genetics/genomics, production systems, bee & fish health. Out of 545 participations, nearly 83% were EU participants.

Figure 7 provides a breakdown of the EU participations among the 23 participating Members States: the top ranked country is UK with 82 participations, followed by Italy (51), Spain (41), The Netherlands (38), Belgium (34), Denmark and Germany (both with 29). France ranks 8th, with 24 participations. **Figure 8** pro-

vides a breakdown of the participations among French entities: there is a lower diversity of participants, with one clear leading entity: INRA.

Overview of portfolios of FP7 research projects under Theme1 (Health)

Around 25 projects were on zoonotic diseases. These projects addressed the medical side of the diseases, but in a number of cases, they included 'veterinary sciences' partners. For instance, the project EDENext "Biology and control of vector-borne infections in Europe" [28] was coordinated by CIRAD. The

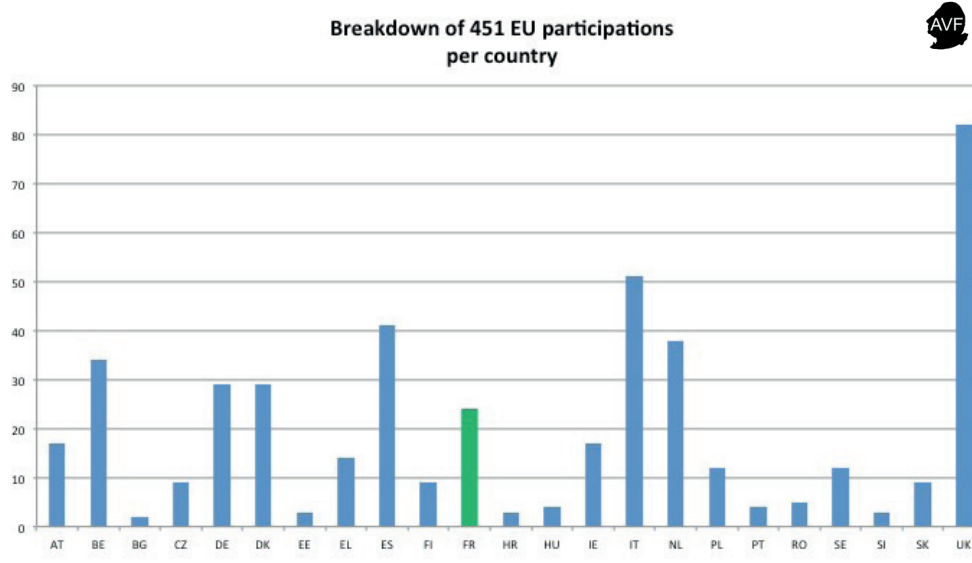


Figure 7: FP7 – 35 SC2 projects on domains relevant to veterinary sciences: food safety, husbandry, animal welfare, animal nutrition, genetics/genomics, production systems, bee & fish health. Breakdown per country of 451 participations of EU Member States.

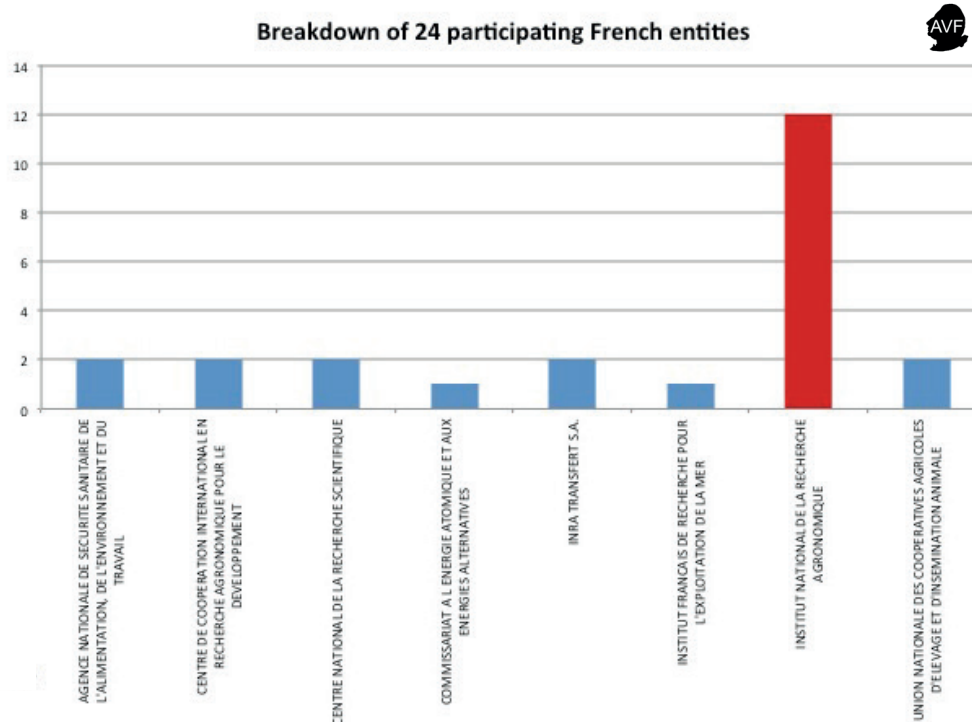


Figure 8: FP7 – 35 SC2 projects on domains relevant to veterinary sciences: food safety, husbandry, animal welfare, animal nutrition, genetics/genomics, production systems, bee & fish health. Breakdown of 24 French participations, per entity.

breakdown of the EU participations among the 23 participating Members States is presented in **figure 9**: the top ranked country is France (48 participations). The breakdown of the participations among French entities is presented in **figure 10**: there is a large diversity of participants, and a very clear leading entity: Pasteur Institute (9 participations). While a large majority of the EU member States participate in EU projects relevant to veterinary sciences, some countries are absent. This is not specific to the livestock/veterinary sciences domains. The leading role of UK on animal health is not surprising. This is consistent with the UK ranks in other livestock research domains, which might be linked at least partly, to the emphasis put under FP7 on genomics, where centres of excellence exist particularly in the UK.

RENEWED APPROACH UNDER HORIZON 2020, WITH EMPHASIS OF SOCIETAL CHALLENGE DRIVEN APPROACH

H2020 notably reinforces the focus on innovation and introduces the “societal challenges”. Previously separate activities have been brought together to focus on the societal challenges such as food security, health, clean energy. The societal challenge driven approach, the focuses on transnational cooperation, were certainly inspired by the Lund Declaration of 2009, stressing in particular that “European research must focus on the Grand Challenges of our time moving beyond current rigid thematic approaches. Challenges must turn into sustainable solutions in areas such as global warming, tightening supplies of energy, water and food, ageing societies, public health, pandemics and security” [29].

Challenges to (animal) agriculture and strategy for agriculture research

European Commission Directorate-General for Agriculture and Rural Development (DG AGRI) is co-managing together with Directorate-General for Research and Innovation (DG RTD) the implementation of Horizon 2020 SC2. DG AGRI is primarily responsible for research policy on primary production and developed a “strategic approach to EU agricultural research and innovation”. Five priority areas for research and innova-

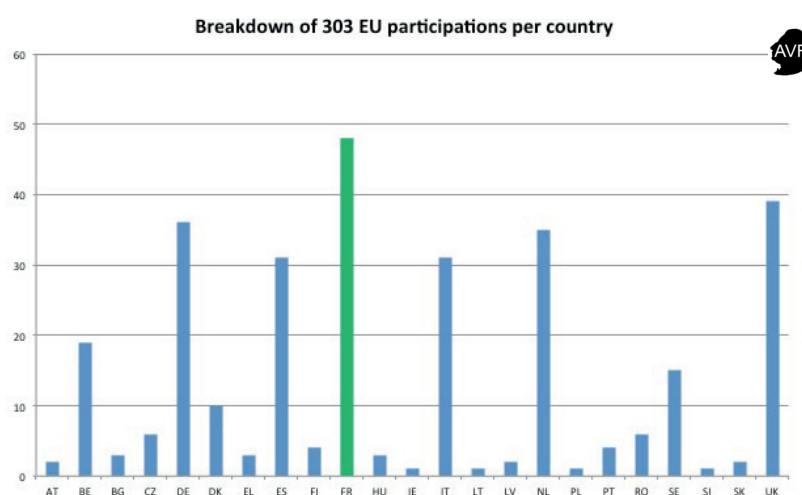


Figure 9: FP7 –25 SC1 (Health) projects on zoonotic diseases. Breakdown per country of 303 participations of EU Member States.

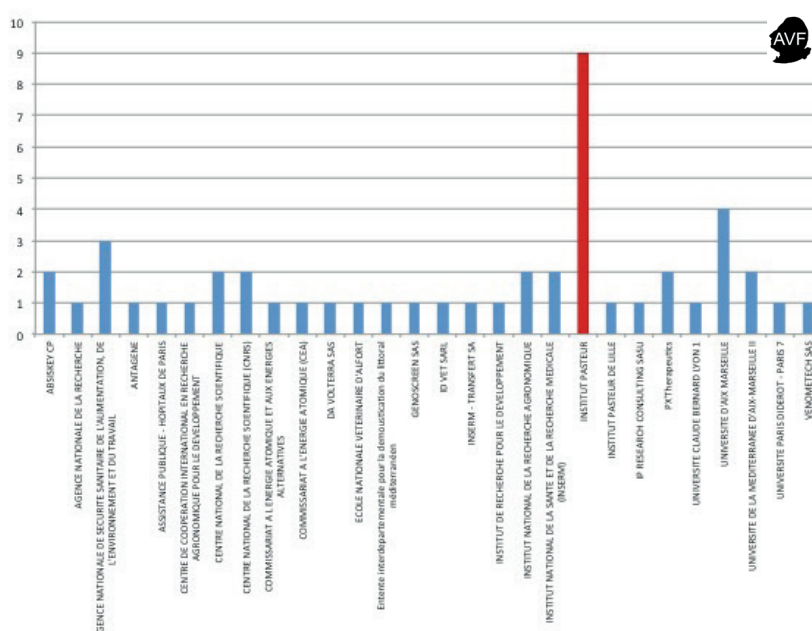


Figure 10: FP7 –25 SC1 (Health) projects on zoonotic diseases. Breakdown of 48 French participations, per entity.

tion have been identified. The priority 2 on healthier plants and animals is the most relevant for veterinary science, but all the priorities are relevant to animal production and to some extent to veterinary sciences understood in the broad sense. The establishment of links between health and other disciplines and aspects of production need to be sought. The European livestock sector, recognising that the animal production sector faces a number of challenges for which research is needed, organised itself to address these challenges. A “think tank”, the “Animal Task Force”, emerged in 2011 as a European platform of research organisation and farmer and industry organisations, working together on a sustainable and competitive European livestock production sector by fostering knowledge development and innovation in the whole animal production chain.

Illustrative horizon 2020 projects/topics/ related initiatives relevant to veterinary sciences

From animal health research to research on animal production: ERA-NET SusAn on “sustainable animal production”

ERA-NETs are public-public partnerships, for fostering cooperation between national/regional R&D programmes. They support the preparation and implementation of joint activities, including calls for transnational projects. In the veterinary domain, a first ERA-NET on infectious animal diseases was launched in 2008: EMIDA (“Coordination of European Research on Emerging and Major Infectious Diseases of livestock”). It emerged as the result of the discussions held in the framework of the European Commission “Standing Committee on Agriculture Research” (SCAR), more specifically in the SCAR collaborating working group on animal health and welfare (CWG AHAW). The EU funded project lasted until end of 2011. It was followed in 2012 by a new ERA-NET, with a remit enlarged to animal health and animal welfare: ANIHOWA, which lasted 4 years. Under these 2 ERA-NETs, 5 joint calls were organised (without EU funding) for a total budget of 75 million euros, solely paid from Member States budgets. 58 projects were selected (source: CWG AHAW)

In order to tackle by a holistic and multidisciplinary approach, the challenge which animal production is facing, a new SCAR CWG was created at the beginning of 2014, on “sustainable animal production” and a topic was published in the call 2015 for an ERA-NET on “sustainable animal production”, covering environmental, social or economic issues, including aspects such as animal health and welfare. SusAn ERA-NET started its operation in January 2016.

Consortia were encouraged to submit cross-cutting research proposals which address all different research areas, and build on the sustainability triangle of economic competitiveness, social acceptability and environmental protection.

European Joint Programme (EJP) Co-fund on One Health (zoonosis –emerging threats)

There is no single definition of One Health [30], a concept previously coined as “One Medicine” According to the FAO, it is a ‘collaborative, international, cross-sectoral, multidisciplinary mechanism to address threats and reduce risks of detrimental infectious diseases at the animal-human-ecosystem interface. With that background, a topic was designed and published in the SC2 work-programme 2017 (23) in order to select a large project (EU contribution to a maximum 50% of the total eligible costs of the action or up to 45 million euros) destined to coordinate research programme managers in the domain of zoonosis and related emerging threats. The main emphasis will be on food-borne microbial infections and intoxications, as well as on One Health related emerging threats such as antimicrobial resistance. A significant long term capacity building and alignment of

research strategies and activities at national and EU level, and support to risk assessment and management are among the expected impacts of the project to be selected.

International Research Consortium on Animal Health

Under FP7, a coordination action for a global network of animal health research funding organisations (acronym STAR-IDAZ) was launched in Spring 2007. The idea was to adapt to a certain extent the concept of ERA-NETs, but without the objective to organise joint calls. Major countries (e.g. USA, China, Brazil...) and some large pharmaceutical companies took part in STAR-IDAZ. DG AGRI proposed to STAR-IDAZ late in 2014 a partnership following a model of international cooperation successfully used in medical research [31]. After successful discussions, STAR-IDAZ IRC was launched in January 2016 in Brussels. These international research consortia (IRC) are soft cooperation mechanisms and are not per se EU funding instruments. STAR-IDAZ IRC is an alliance of research funders and its overall objective is to coordinate research at the international level to contribute to new and improved animal health strategies for at least 30 priority diseases/infections/issues. The deliverables include: candidate vaccines, diagnostics, therapeutics and other animal health products, procedures and key scientific information and tools to support risk analysis and disease control. STAR-IDAZ IRC is governed through an Executive Committee, a Scientific Committee and a variable number of working groups all supported by a secretariat. Coordination of research is intended to take place primarily through coordinated research projects funded according to each funding member’s procedures and budgets. H2020 research topics are earmarked as contributing to STAR-IDAZ IRC. The G20 “Meeting of Agriculture Chief Scientists” (MACS) in May 2016 welcomed “the establishment of the STAR-IDAZ International Research Consortium on animal diseases and high priority vaccines”[32].

CONCLUSION

Animal health and food safety, core veterinary fields, have been and are still well represented in European research funding. The future is undefined, but these domains fit into important challenges such as food security and health. Under H2020, “European veterinary research” is included in broader issues / challenges, concerning the sustainability of agriculture. The challenges for the “European veterinary research” are interconnected with those faced by livestock production and agriculture. The challenges for “European veterinary research” are also impacted by the focuses of European research in general: i) focus on rather applied research corresponding to “societal challenges”, ii) multi and trans-disciplinary (e.g. One-Health, “System” approach) and iii) impact, stimulated by the multi-stakeholder approach, association with the private sector. The European approach aims to improve coordination between countries, stimulate synergies, avoid duplication, and strengthen European leadership. Transnational cooperation

on veterinary sciences within Europe is moderate and could certainly be improved. France ranks reasonably well among other EU countries, as regards the number of participations in EU projects relevant to “veterinary sciences”, more in the core domain of the veterinary profession than in other relevant fields of livestock and agriculture (e.g. zootechny, nutrition,

environment, socio-economic). Opportunities exist for the veterinary profession in research, in areas in which other professions are active. Appropriate initial and continued education taking into account these areas and the challenges faced by livestock, agriculture and consumers at different geographical levels is crucial.

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