TRENDS IN EUROPEAN PUBLIC INVESTMENT IN ANIMAL BREEDING R&I

From Framework Programme 7 to Horizon Europe (2007–2025)

This study provides the first systematic mapping of EU public investment in animal breeding R&I across FP7, Horizon 2020 and the first half of Horizon Europe (2007-2025). Drawing on 208 projects and EUR 551.2M in EU funding, the analysis reveals a structural decline in animal breeding's relative funding share, a shift towards earlier-stage research, and growing resource dilution across larger consortia. Despite increasing expectations for animal breeding to contribute to climate, welfare and food security goals, the sector has not benefited proportionally from the growth of EU R&I budgets. The report proposes targeted policy recommendations to restore animal breeding's strategic position in the European Research Area.

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EXECUTIVE SUMMARY

EUR 551.2M	208 PROJECTS	2007 - 2025	58 COUNTRIES	921 PARTNERS
Total EU investment	Project analysed	18-year analysis	Partner countries	Unique partner organisations

Over the past 18 years, the EU has publicly invested EUR 551.2 million across 208 animal breeding research and innovation projects under three Framework Programmes - FP7 (2007-2013), Horizon 2020 (2014-2020) and the first half of Horizon Europe (2021-2025). While the absolute investment has been substantial, the share of total Framework Programme budgets directed to animal breeding has declined over time. The table below summarises the distribution across programmes.

EU Investment by Framework Programme

Framework Programme	Projects	EU Contribution	Share of total	Partners
FP7 (2007 - 2013)	94	EUR 242M	44%	825
H2020 (2014 - 2020)	91	EUR 254M	46%	880
Horizon Europe (2021 - 25, partial)	23	EUR 55M	10%	218

Note: Horizon Europe figures cover projects up to March 2025 only (programme ongoing).

The decline in relative investment coincides with a shift towards earlier-stage research (TRL Portfolio). Private-sector partners have remained stable at 32% of consortium membership across all three programmes (Partner Types) but consistently receive lower average allocations than public partners.

TRL Profile of Portfolio

Stage	Projects	Share
Early stage (TRL 1 - 3)	81	41%
Mid stage (TRL 4 - 6)	90	46%
Late stage (TRL 7 - 9)	25	13%
Total (excl. no data)	**196**	**100%**

Partner Types (all FPs)

Partner type	Count	Share
Public / Academic (PU)	1303	68%
Private sector (PR)	620	32%
Total	**1923**	**100%**

KEY FINDINGS

The analysis draws on 208 Framework Programme projects and 1,923 partner-project records. Seven cross-cutting findings emerge from the evidence base.

FINDING	DETAIL
Funding share declining	Total FP budgets grew, but animal breeding's proportional share fell, most sharply in early Horizon Europe.
HE severely underfunded vs earlier FPs	EUR 54.9M for 23 HE projects to date vs EUR 242M (FP7) and EUR 254M (H2020). Even when accounting for partial coverage, the trajectory points downward.
Research shifting to earlier stages	41% of projects are early-stage (TRL 1-3); only 13% are late-stage. This raises questions about continuity from lab to farm.
Consortia growing but funding per partner is not	Average consortium size increased while average partner allocation stayed flat or declined - resources are being spread thinner.
Private sector stable at 32%	620 of 1,923 partner slots are private actors -- consistent across FPs, but it should be noted that private partners receive lower average allocations.
Species and trait coverage broadened	Aquaculture (38%) and cattle dominate, but welfare, environmental and functional traits are increasingly present.
Biodiversity and genetic resources growing	More projects address at-risk breeds and conservation, aligned with EU biodiversity targets and Farm to Fork.

These findings describe a sector under growing pressure: animal breeding is expected to contribute to food security, climate adaptation, welfare and biodiversity, yet its funding share has not kept pace.

1. Introduction

Animal breeding research and innovation (R&I) underpins the long-term productivity, resilience, and sustainability of European livestock and aquaculture sectors. By improving the genetic potential of farmed animals for traits ranging from feed efficiency and disease resistance to welfare and reduced environmental impact, breeding programmes generate benefits that ripple across the entire agri-food chain. This means considering farm-level profitability but also the fulfilment of the European Union's climate and biodiversity commitments.

Since 2007, the **European Union's Framework Programmes (FPs)** have been the principal public instrument for funding collaborative R&I at scale. **From the Seventh Framework Programme (FP7, 2007–2013) through Horizon 2020 (2014–2020) and into the first half of Horizon Europe (2021–2027),** successive programmes have directed billions of euros toward agricultural research, including work on animal genetics and breeding to varying degrees. Yet despite the strategic importance of the sector, no systematic, cross-programme analysis of how those funds have been allocated to animal breeding R&I has previously been undertaken.

This report fills that gap. It presents the results of a comprehensive mapping of EU-funded animal breeding R&I projects from FP7 to Horizon Europe, with a data cut-off of March 2025 (Annex I). Covering 208 projects with an estimated combined value of €551.2 million (2020 prices), the study traces how investment levels, consortium structures, species coverage, technological maturity, and trait priorities have evolved over nearly two decades of European research programming. An additional 58 projects funded through complementary EU instruments outside the Framework Programmes are catalogued in Annex II for transparency.

The report was designed to include projects that worked on terrestrial livestock, aquaculture, genetic resources, and model species with direct applicability to breeding programmes. The findings that emerge are both informative and concerning. While the total **Framework Programme budget grew by 43% over the period under review, the share dedicated to animal breeding has almost halved**. The sharpest contraction is visible in early Horizon Europe, where current trajectories suggest that final programme investment in animal breeding R&I will fall far short of levels achieved under FP7 or Horizon 2020. This decline stands in stark contrast to the growing ambition of European policies such as the Farm to Fork Strategy and the EU Biodiversity Strategy, as they explicitly call for more sustainable and resilient food production systems, goals that animal breeding research is well placed to support.

The report is structured as follows. Following a description of the methodology, the analysis examines funding trends across Framework Programmes and subprogrammes, the international reach of European animal breeding consortia, and patterns in project structure, duration, and budget. Subsequent sections explore the distribution of Technology Readiness Levels (TRLs), species and trait priorities, project outcomes, and the landscape of private and public sector participation. The report closes with scenario projections for the remainder of Horizon Europe and a set of evidence-based recommendations aimed at restoring a commensurate level of public investment in animal breeding R&I.

2. Methodology

This study followed a structured, multi-phase approach and covers EU-funded animal-breeding R&I from FP7 to Horizon Europe, with a cut-off in March 2025. We first mapped the funding landscape across all Framework Programme pillars and themes, and then added relevant ERA-NETs, JPIs and related EU-level instruments. Nationally funded projects were excluded to ensure comparison with other FP analyses, while projects looking at genetic resource, aquatics, and model species were included.

Projects investigated focused on terrestrial and aquatic livestock species. We also included model-species work, but only where outcomes were directly transferable to livestock breeding or an applied breeding programme. Actions centred on genetic resources and research databases were also included. Projects dealing primarily with nutritional additives and feed research, vaccines, management practices, wild animals, precision-livestock hardware, pharmaceutical research, disease treatment or detection technologies, monitoring tools, or ancient genomes without a demonstrable link to livestock breeding were all excluded from the report.

Data were compiled through keyword searches of public databases (notably CORDIS, FACCE JPI's project wheel, ERA LEARN, Biodiversa+), complemented by manual cross-referencing of project websites, call texts, topics and publications to identify related actions. We combined Python scripts with Excel for efficient extraction, cleaning and harmonisation; where available, recent Framework Programme metadata were retrieved via CORDIS API services for registered users. All financial figures were converted to 2020 euros using World Bank inflation series to enable comparison across 18 years of programming. At the time, the latest figures released by the European Commission referred to 2020 prices, which is why the report also adopted that approach.

Analyses were conducted in Excel and Python. The core analysis prioritises projects with complete datasets, which amounted to 208 projects. The remaining 58 projects with partial information are listed separately in Annex II for transparency.

For Horizon Europe, the European Commission reported that 57.07% of the total programme budget had been used by the end of 2024. Where we extrapolate to compare FP periods, we assume the second half of Horizon Europe follows a similar pattern; alternative scenarios are presented in Section 5.1. We acknowledge this introduces uncertainty, yet it already indicates a clear trend and highlights the need for sustained investment in animal breeding through 2027.

Technology Readiness Levels (TRLs) follow the Horizon 2020 General Annex definitions. Completed projects were assigned an achieved TRL based on the described outcomes; ongoing projects were tagged with their intended TRL. To compare subprogrammes across FPs despite structural changes (e.g. reshaping of pillars from FP7 to H2020), we applied an equivalence list and report the main subprogrammes funding animal-breeding R&I in Table 1.

To enable comparison across Framework Programmes, we mapped differently named subprogrammes to an equivalence list derived from the official legislative descriptions.[1] Because FP7 and Horizon 2020 underwent substantial structural reshaping, a direct pillar/priority match would be misleading. Annex III lays out the full architecture of all three FPs, with the relevant themes highlighted, and Table 1 consolidates the key themes that most strongly fund R&I in animal breeding.

[1] European Parliament (2006). Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013).

European Parliament (2013). Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC. Text with EEA relevance.

European Parliament. (2021). Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013. Text with EEA relevance.

Table 1 The most relevant clusters for animal breeding projects and their naming throughout the Framework Programmes and their reference in this report.

FP7		Horizon 2020		Horizon Europe		In this report
Food, Agriculture and Fisheries and Biotechnology *was a part of programme Cooperation*	=	Food security, sustainable agriculture and forestry, marine, maritime, inland water research and bioeconomy *was a part of Priority 3 Societal Challenges*	=	Food, Bioeconomy, Natural Resources, Agriculture and Environment *was a part of Pillar 2 Industrial Competitiveness and Global Challenges*	=	Agrifood
People Programme	=	Marie Skłodowska-Curie actions *was a part of Priority 1 Excellent Science*	=	Marie Skłodowska-Curie actions *was a part of Pillar 1 Excellent Science*	=	MSCA
Ideas Programme	=	European Research Council (ERC) *was a part of Priority 1 Excellent Science*	=	European Research Council (ERC) *was a part of Pillar 1 Excellent Science*	=	ERC

3. International Reach of European Animal Breeding

Partners from 58 different countries collaborated on animal breeding projects in the past 18 years. The majority of funds are dedicated to countries of the European Union (including the UK), and the top non-European funded partners come from Israel, followed by Switzerland, refer to Figure 1. Organisations based in France received the highest funding in total over the last two decades, followed by Spain, the United Kingdom, Netherlands and Norway. A full list of funding breakdown per country can be found in Annex VII.

Many organisations (68%) only participated in one project, while the top four organisations participated in 10% of all projects. These four include Wageningen University, including Wageningen Research on top with 67 projects (received 29.8 million EUR), followed by INRAE with 66 (but receiving the most funds, namely 37.6 million EUR). After a wide gap, CSIC sits in third place with 39 projects and 13.4 million EUR received and the University of Edinburgh on the fourth place with 26 projects and 13.4 million EUR received in public funds. Funding depends on the nature of the project, the types of outcomes, but also on what role the organisation had in the project. Typically, bigger research institutes receive leading roles in projects due to their logistical and research capacity, and the project coordinators receive a higher portion of the funding as they take over many organisational tasks along with the other research tasks.

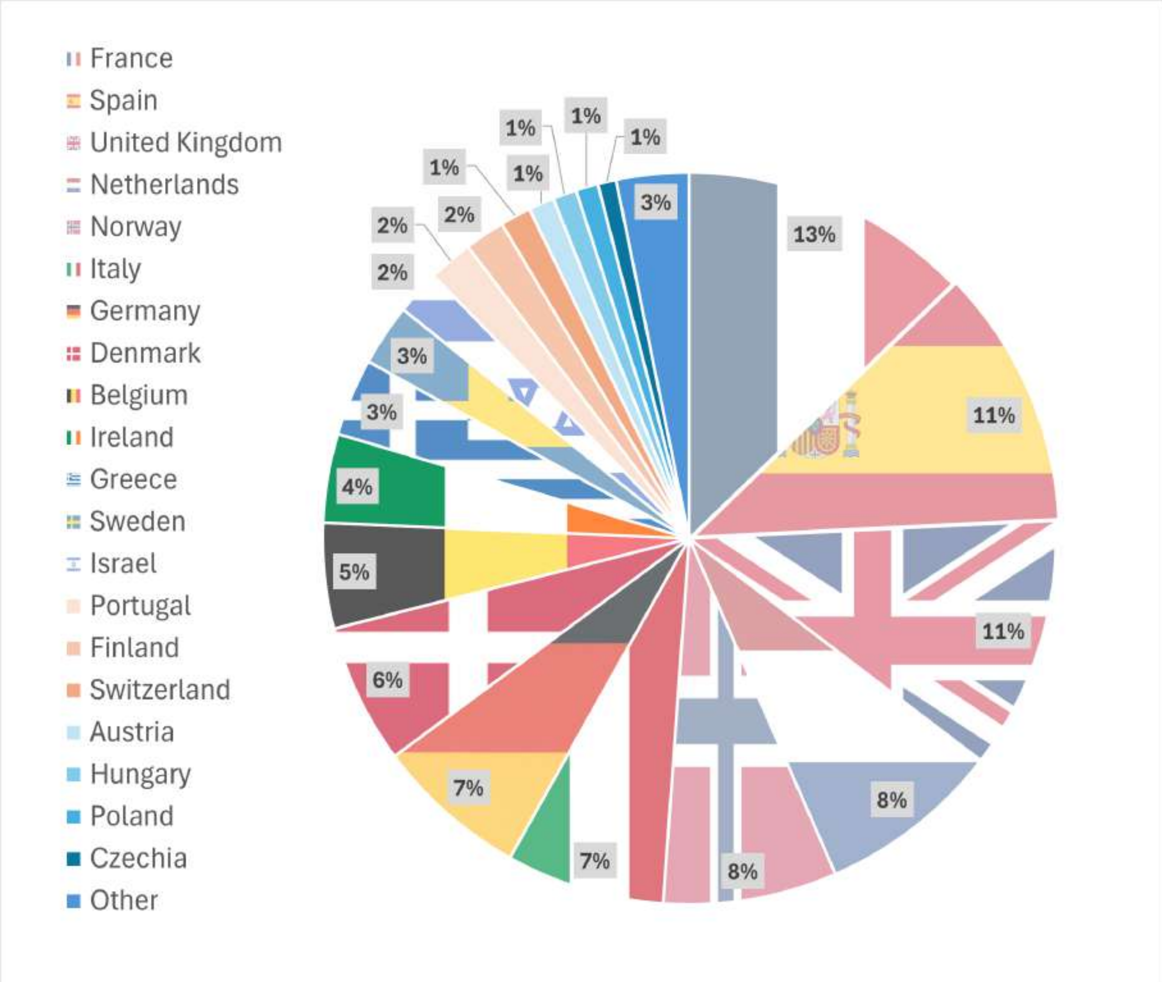


Figure 1: Total funding dedicated to different countries between FP7-Horizon Europe, including 38 other countries

4. Funding for R&I in Animal Breeding Plummets

Main pillars or sections of the Framework Programmes that fund animal breeding research are ERC (previously called Ideas), Marie Skłodowska-Curie Actions (previously called People), and the Agrifood Cluster (the 6th Cluster in Horizon Europe=2nd Cluster in Horizon 2020=Food Subprogramme under FP7). These three accounted for 83% of funding dedicated to animal breeding research. See Table 1 above for clarity on how these compare across the different programmes. There were also a couple of projects funded under other parts of FPs: Industrial Leadership pillar, under Capacities/Research and under the Widening participation and spreading excellence.

Over the last 20 years, the overall Framework Programme budget grew by 43%, yet the share dedicated to animal breeding has almost halved. This drop is particularly visible in the Agrifood cluster, where total cluster funding increased sharply, but animal breeding investment decreased, see Table 2. Animal breeding experienced a stark decrease in funding, with 47% less funding dedicated to animal breeding R&I in Horizon Europe compared to FP7. The decrease is seen across the board, in all categories listed. This trend reflects a clear misalignment between thematic expansion and sectoral allocation.

Table 2: Breakdown of trends in funding in animal breeding from FP7 to Horizon Europe. The animal breeding funding proportions are projections based on the spending recorded in the first half of the programme.

Programme	Change from FP7 to Horizon Europe
Agrifood Animal Breeding Funding	-56%
Total Agrifood Budget	+277%
MSCA Animal Breeding Funding	-17%
Total MSCA Budget	+13%
ERC Animal Breeding Funding	-66%
Total ERC Budget	+73%
Research Capacities Animal Breeding Funding	-65%
Total Research Capacities Budget	+13%
Total Animal Breeding Funding	-47%
Total FP Budget	+43%

The SME funding trend is excluded from Table 2, because it experienced a lot of restructuring, which makes it difficult to discern the actual budget dedicated to SME-specific R&I. SME support, restructured into the EIC instrument, caused a visible spike in overall budget for SME-led research and innovation. Yet despite these changes, animal breeding-related SME investments increased for about 20%, from 18.7 million EURworth of animal breeding projects in FP7, to 9.7 million EUR in Horizon Europe, with projected 22.6 million by the end of the programme.

These trends come as a surprise after Horizon 2020, where a slight increase in animal breeding R&I was recorded as seen in Figure 2. The funding of Horizon 2020 reached 254.3 million, while Horizon Europe is currently projected to reach a mere 127.9 million EUR.

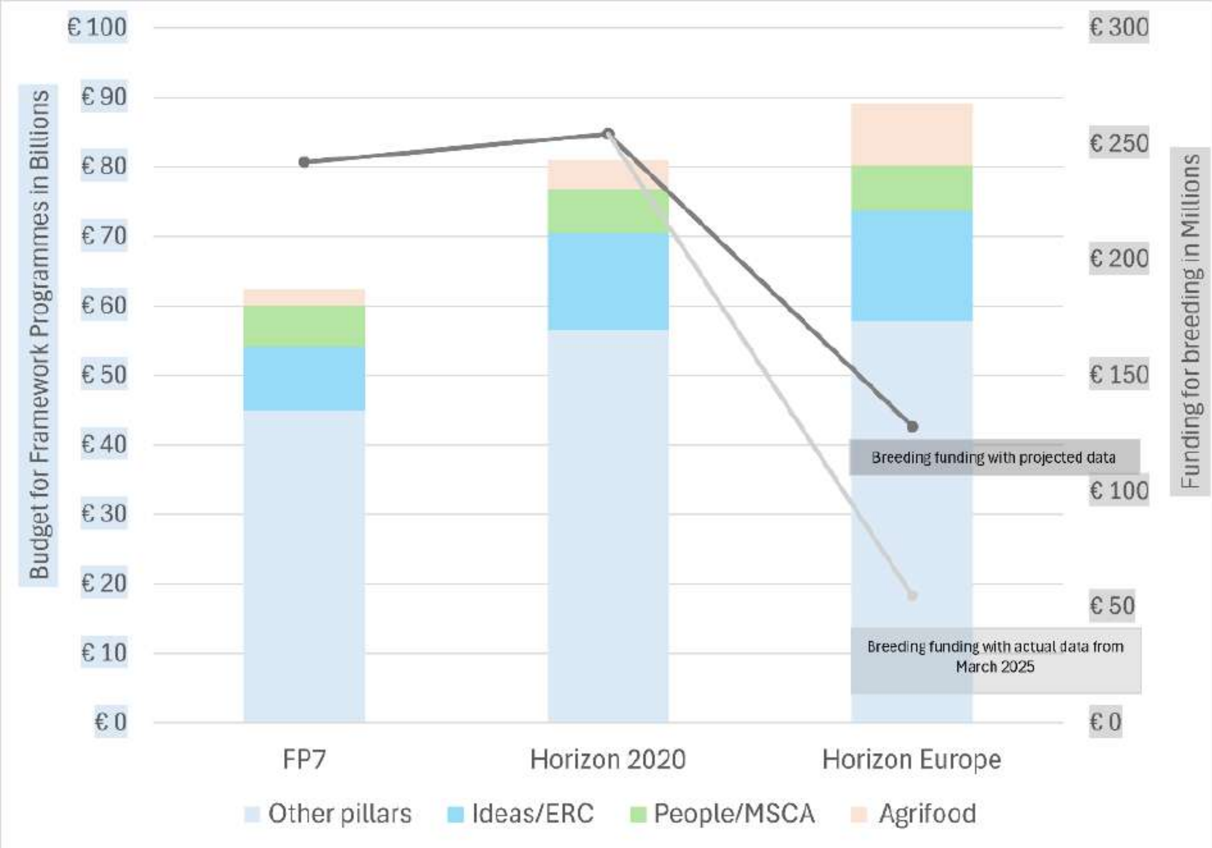


Figure 2: Funding trends for Framework Programmes (FPs) from FP7 to Horizon Europe. Stacked bars represent the total funding amounts for entire FPs (y axis on the left), with animal breeding-relevant subprogrammes indicated in different colours. The dark grey line shows the projected funding allocation to R&I in animal breeding, while the light grey line shows the actual funding allocation at the time of data collection.

5. Project's Building Blocks

Project duration heavily depends on the subprogramme's design. Industrial Leadership and MSCA actions are predictably shorter (about 14–33 months on average), whereas Agrifood projects run longer timelines at roughly 44–51 months.

Funding patterns are more revealing. As seen in Figure 3, projects' budgets vary across programmes, but the highest variability of projects so far was recorded in Horizon 2020. Since it is oftentimes the case that bigger projects are funded at the end of the framework programme, this graph could look very differently once Horizon Europe wraps up in 2027.

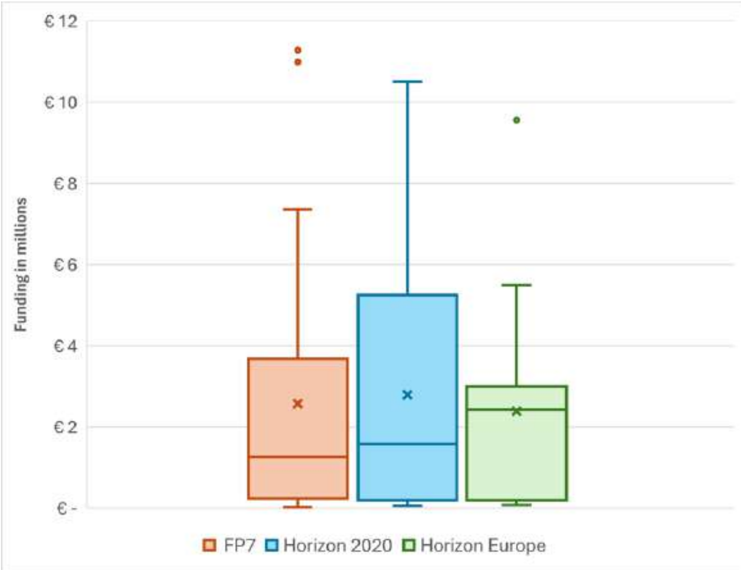


Figure 3: Average funding dedicated to animal breeding projects across FPs, including first half of Horizon Europe.

In Figure 4, we can see the funding trend within clusters. Projects funded under ERC are receiving less funding on average in the current FP compared to the previous FPs. This could partially be explained through a higher number of projects funded; there were 5 projects funded under ERC in FP7 and 12 in Horizon 2020. However, in Horizon Europe so far, by early 2025, only 3 projects are found under ERC. Since this cluster funds a lot of frontier and fundamental science, its support is crucial for later projects to then translate those findings into applied research, like the one found under the Agrifood cluster.

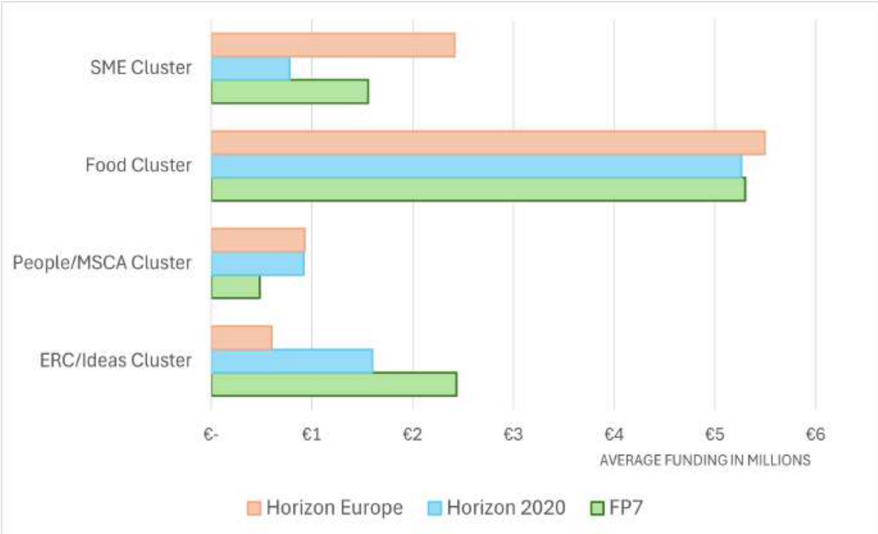


Figure 4: Average funding per project in animal breeding relevant clusters of FPs

Average ERC grants approved between FP7 and H2020 show a decrease from ≈€2.4 million to ≈€1.6 million per project, while MSCA's fundamental-research projects almost doubled (≈€0.48 m → ≈€0.92 m). Agrifood cluster stayed remarkably stable at ≈€5.2–€5.4 million per project on average across FPs. By contrast, SME/Industrial clusters are hard to compare due to restructuring and shifting instruments, with averages moving from ≈€1.6 million (FP7) to ≈€0.78 million (H2020) and back up to ≈€2.4 million in Horizon Europe.

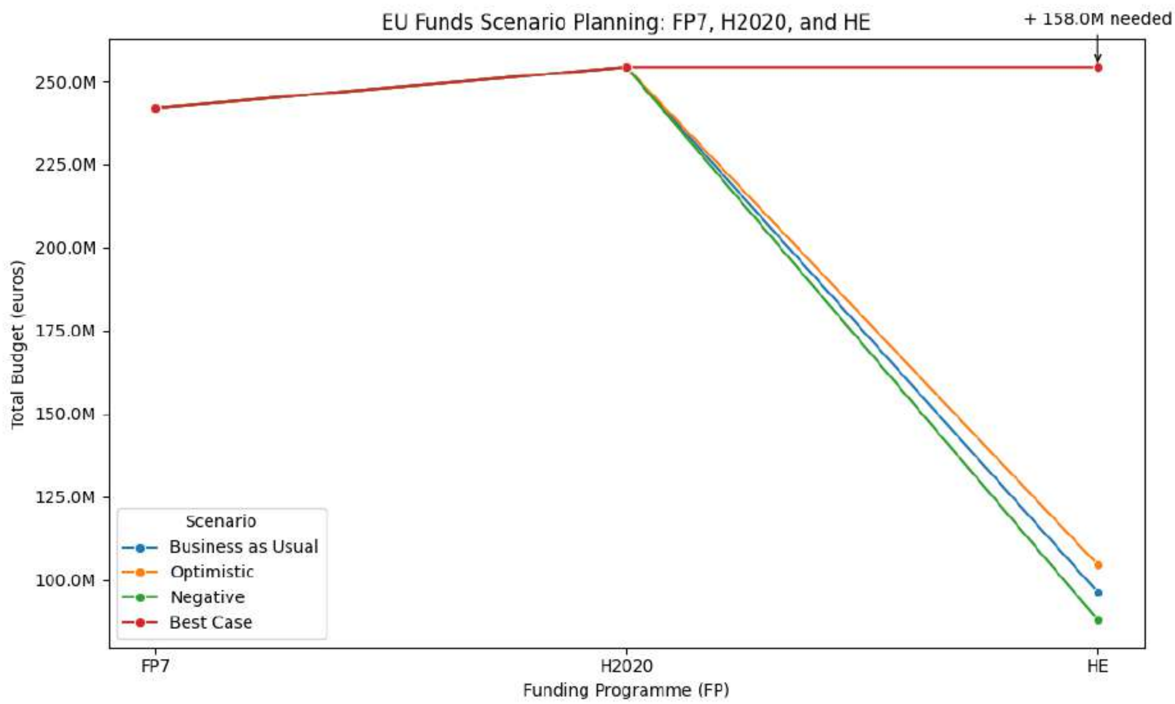
Applied animal-breeding research is tightly regulated and technically complex. The reason lies in long generation intervals, multi-trait trade-offs, and welfare and ethics constraints. All these factors slow down translation from fundamental to applied research. It is therefore unsurprising that the MSCA strand accounts for the largest share of animal-breeding R&I, as it primarily supports fundamental, exploratory work and researcher training. In FP7, 38 MSCA projects met our criteria; in Horizon 2020, 31 did so. In the first half of Horizon Europe, MSCA funded 7 animal breeding-related projects.

Beyond MSCA, the Agrifood cluster accounts for the largest share of animal-breeding R&I, with 33 projects in FP7, 31 in Horizon 2020, and 6 in the first half of Horizon Europe. Average project budgets remain stable because call design sets possible fundings and action types, which in turn determines consortium size, work-package scope, and the scale of pilot work. Although the often used technologies such as sequencing and other -omics costs have fallen, savings are offset by investment in data infrastructure, ethics and welfare compliance, and multi-site stakeholder engagement. Finally, the Framework Programmes tend to distribute resources across a larger number of actions rather than increase per-project funding, reinforcing this stability.

5.1. Scenario Outlook for Horizon Europe R&I in Animal Breeding

Horizon Europe is tracking well below FP7 and Horizon 2020 for animal-breeding R&I. By the time of analysis, €54.9 million had been formally committed to animal breeding-relevant projects. If the pattern from the first half of the programme continues, the business-as-usual (BAU) projection reaches only ≈€96.3 million by end-2027 (Figure 5). Even an optimistic trajectory that assumes a 20% uplift on the first-half pattern, would still land far short of FP7/H2020 levels. In a best-case scenario, funding would at least match H2020 instead of declining. However, doing so would require ≈€158 million additional allocation within HE (over and above the current trajectory), which is improbable given remaining work programmes.

A new animal-breeding call was announced in early 2025, which foresees €12 million for animal breeding and genetics for climate change.[2] This was announced shortly after the data collection for this report was complete, and therefore no projects were funded under this call yet. The call is a welcome but marginal improvement relative to historic envelopes. Under business as usual, closing the gap from the current €54.9 million to the ≈€96.3 million projection implies ≈€41.4 million still missing to match the previous programme's funding; the announced €12 million would reduce that to ≈€29.4 million. In other words, even if an optimistic scenario is met, HE would remain a step down from FP7/H2020 in absolute euros for animal-breeding research and innovation.



[2] HORIZON-CL6-2025-02-FARM2FORK-07

Figure 5: EU funds scenario planning for animal-breeding R&I (FP7, H2020, HE). BAU ≈€96.3 m; optimistic (BAU + 20%) still below FP7/H2020; best-case requires ≈€158 m extra to match H2020.

6. Consortia

Consortium size in animal breeding projects is not only a matter of project scale but also reflects the function of each funding instrument within the research and innovation pipeline.

ERC mostly funds one lead researcher at one host institution. In our dataset, only two ERC projects had three beneficiaries, likely a collaborating or guest institutions. MSCA is similar: many funds go to a single host, but the training networks (ITN/Doctoral Networks) can be much larger because they place PhD/early-career researchers across multiple sites, so up to 20–23 organisations can be involved. Agrifood cluster shows the widest range of sizes because it backs multi-actor Research and Innovation Actions, Collaborative Projects and Coordination or Innovation Actions. Most consortia sit around 12–25 partners. Fewer projects are truly small (under 10 partners), and a handful in Horizon 2020 were very large, reaching 30–42 partners. Other strands that touched animal breeding (Industrial Leadership, SME instruments, Capacities, and Spreading Excellence and Widening Participation) tend to be smaller (often up to ~11 partners, sometimes 14–24). These patterns reflect the work: investigator-driven discovery (ERC), researcher training and mobility (MSCA), and multi-actor testing and demonstration (Agrifood).

From the standpoint of outcomes, size has trade-offs. Larger teams enable cross-species work, multi-site phenotyping, and stakeholder buy-in (farmers, breeding companies, data organisations), but they dilute budget per partner and raise coordination costs. Smaller teams move faster and can develop methods or tools efficiently, but they struggle to run long, on-farm trials or to hit higher TRLs without follow-up funding. In short, ERC/MSCA feed upstream science and skills; Agrifood provides the consortium breadth needed to translate genetics into practice.

6.1. Private and Public Sector Involvement

Private partners from France, Spain, Italy, the Netherlands and UK in that order were most commonly active in animal breeding projects. From Figure 6 it is clear that private partners are steadily involved throughout the FPs, representing roughly 30% of the consortia in each FP. Private partners are usually granted significantly lower average funding (e.g., in H2020: ~€164.000 for private vs. €350.000 for public partners) as depicted in Figure 7. Around 20% of the total funding was dedicated to private partners in FP7 and Horizon 2020. It appears to rise to 32% in Horizon Europe, but this is driven by a small sample that includes a few SME-led projects. Notable outliers include Omegga GmbH, Orbem GmbH, FarmInsect GmbH (Germany) and FreezeM Cryogenics LTD (Israel), each receiving €2.2–€2.5 m for technology focusing on laying hens or black soldier flies. The outcomes were focused on male-chick culling reduction, cryopreservation, or improved breeding lines.

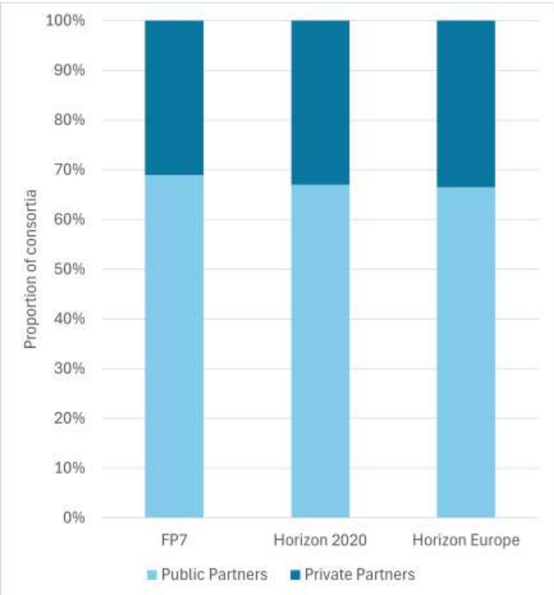


Figure 6: Proportion of private and public sector partners in animal breeding project consortia throughout FPs

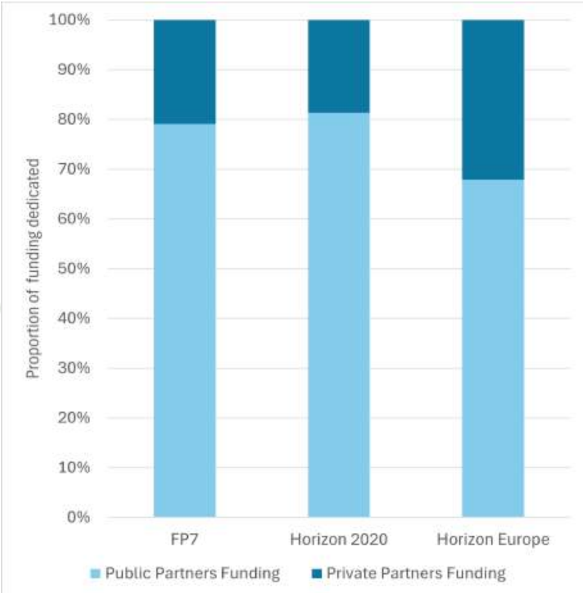


Figure 7: Proportion of funding dedicated to private and public sector involved in animal breeding projects throughout FPs

By type, the private sector is often involved through various associations (23% of the private sector), which include agricultural, research, breeding, livestock and aquaculture associations. In Figure 8 we see that second place belongs to aquaculture business (16% of the private sector involvement), which was well represented throughout the years, followed by research and service companies (11%), breeding companies (10%). These roles align with project needs: associations facilitate access to farms and data; aquaculture and breeding firms support trials and genetic pipelines; service companies provide analytics and infrastructure.

This pattern suggests industry is structurally involved but could be potentially under-resourced per partner, unless the private partners contribute their own funds, which is sometimes the case.

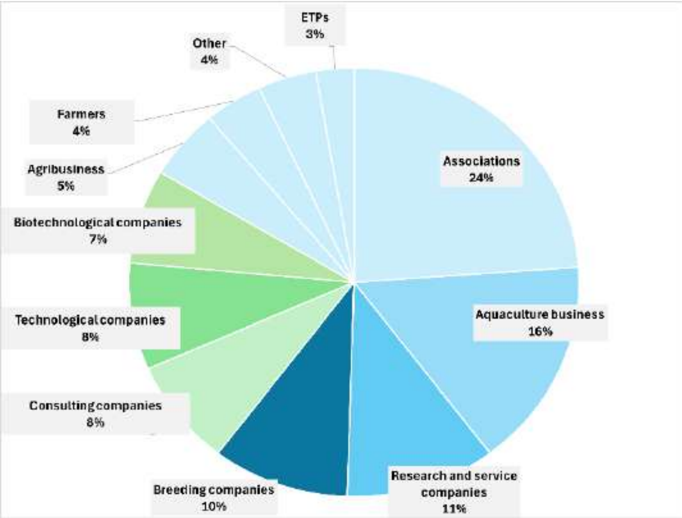


Figure 8: Types of private partners involved in animal breeding projects between FP7 and first half of Horizon Europe

The main public sector participants come from the same countries as the private sector, with a slightly different order: Spanish organisations are followed by the UK, France, Italy and the Netherlands. A bit over half of the public sector participants belong to higher or secondary education establishments (52%), followed by research organisations (42%), as depicted in Figure 9. The last 6% of the public sector is represented through public bodies such as governments, councils, ministries and foundations.

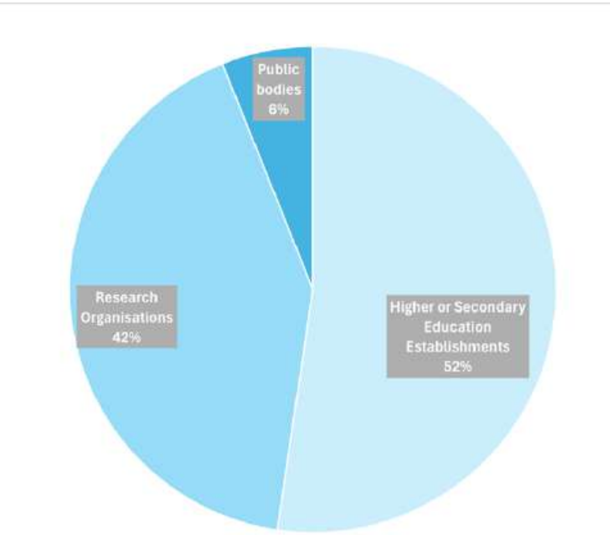


Figure 9: Types of public partners involved in animal breeding projects between FP7 and first half of Horizon Europe

7. Technology Readiness Levels

The analysis of Technology Readiness Levels (TRLs) across EU-funded animal breeding projects provides insight into the maturity and application potential of the research being supported. These estimations were based on publicly available deliverables, publications describing validation stages, and the presence of end-user applications within the project duration. In FP7, TRLs ranged widely from basic research (26% of projects at TRL 1 and 29% of projects at TRL 2-4) through development and validation phases, with 33% of projects estimated to have reached TRL 5-6. Around 11% of projects reached TRL 7-8, and a couple of projects did not deliver enough data to estimate a TRL reached, see Figure 10.

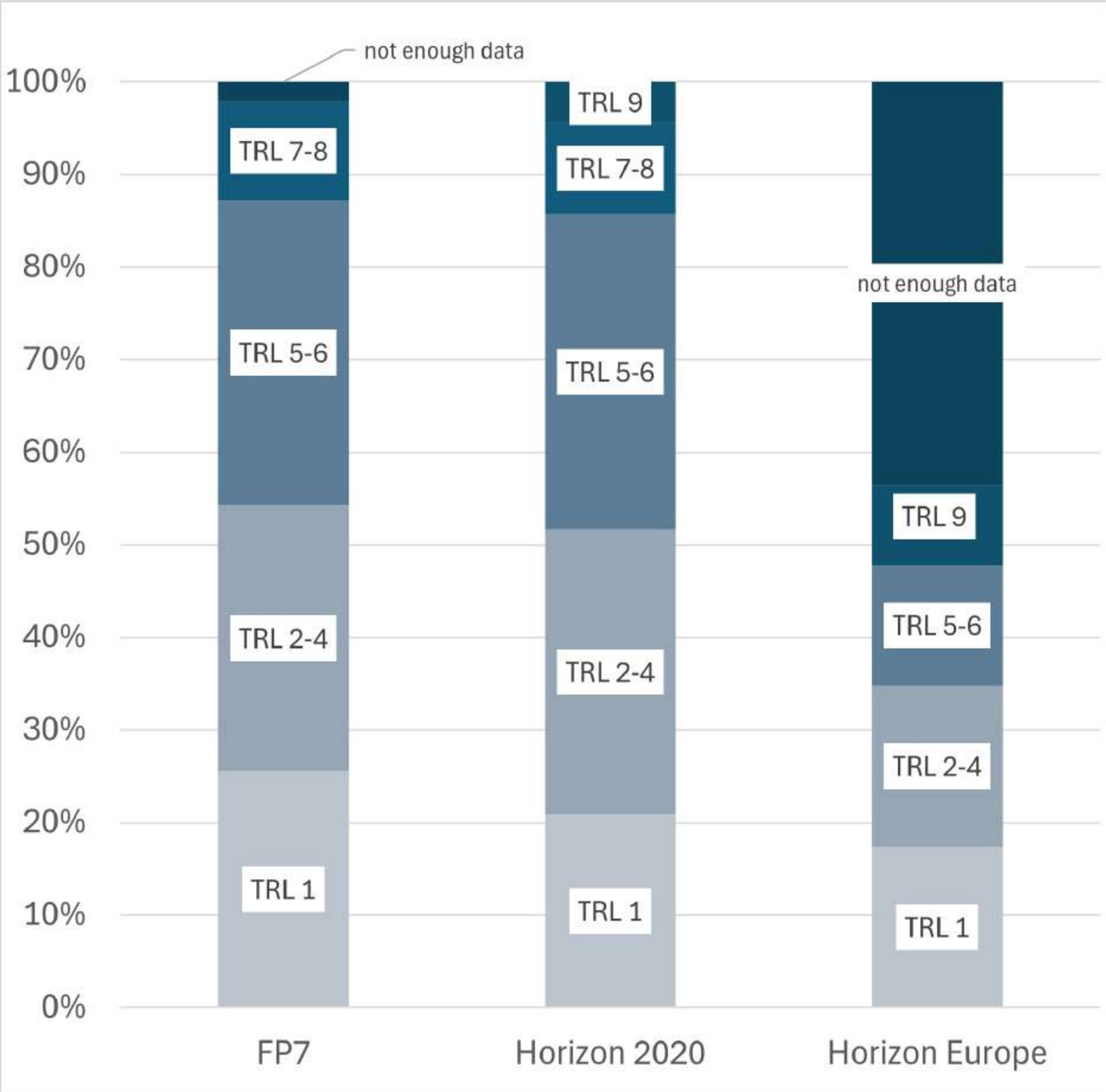


Figure 10: Distribution of projects reaching a specific TRL

This balance reflects the exploratory nature of many early animal breeding projects, alongside emerging interest in applied tools such as genomic selection and early decision support platforms. In Horizon 2020, there was a slight shift toward maturity: a slight drop in the lowest TRLs was made up for in the higher tiers. Four projects in Horizon

2020 are estimated to have achieved TRL 9. This would, for example, mean delivering market-ready sexing technology or semen-quality analysis tools. Projects under Horizon 2020 often focused on improving efficiency traits, integrating phenotyping platforms, or operationalising breeding strategies in livestock and aquaculture systems. Several projects serve as good examples of high TRL achievement. For instance, projects that developed on-farm genomic tools for selection in pigs and poultry, or integrated breeding value prediction models into commercial platforms, were assessed at TRL 7 or 8 due to their successful implementation in operational settings. One Horizon 2020 project reached TRL 9 by field-testing a sensor-integrated decision support system for dairy cattle selection, which included farm-level deployment and feedback loops for breeders. The solution is commercialised and used on the market today. In aquaculture, a project estimating disease resistance and implementing multi-trait genomic selection across commercial lines of rainbow trout reached TRL 6-7, supported by trials under realistic production environments and early commercial uptake. The initial years of Horizon Europe, however, show a reversal of this trend. Ten projects did not have sufficient data to assess the projected TRL. Of the 11 projects with available TRL data, most remained in early stages, with only three achieving TRL 6 or higher. The majority are positioned between TRL 1 and 3. This pattern may be partly explained by the implementation timeline, as many Horizon Europe projects are still ongoing. Partially, this could also be explained by a renewed focus on enabling technologies and broader systems thinking under Cluster 6 ("Farm to Fork" and related priorities).

In addition to tracking TRL distributions, statistical analysis confirms that technological readiness levels vary significantly depending on the cluster or subprogramme they are funded under. This is again expected as the design of calls defines the expected outcomes and deliverables, even if on a more general superficial level. More specifically, pairwise comparisons show that projects in the Agrifood cluster achieve TRLs approximately 2.5 TRL points higher than those in ERC and about 2 TRL points higher than those under MSCA. Projects led under Industrial Leadership: SME funding, which often support close-to-market applications or industry-led initiatives, have the highest TRLs. These projects' outcomes scored on average 3.9 TRL points higher than ERC projects.

A closer look at correlations between TRL and other variables showcases additional patterns. TRL correlates most strongly with private sector involvement ($r = 0.43$)3 and consortium size ($r = 0.29$), suggesting that projects engaging more private actors and building larger consortia tend to develop more mature technologies. Funding levels also show a positive correlation with TRL ($r = 0.28$), though the relationship is less

[3] r= Pearson correlation coefficient, where -1 perfect negative linear relationship (if one variable goes up, the other one goes down) and +1 means perfect positive linear relationship

pronounced than with private partner participation. Interestingly, project duration (length in months) does not appear to correlate strongly with TRL ($r = -0.07$), indicating that longer projects do not necessarily yield more advanced technologies. These findings highlight the structural impact of funding instruments on technological maturity. Clusters designed for industry collaboration and downstream application, such as Food or SME-targeted schemes, consistently foster higher TRL outcomes. In contrast, fundamental research clusters like ERC and MSCA continue to play a vital but earlier-stage role in the innovation pipeline. An important part of bridging gaps across the R&I ecosystem is coordinating follow-up funding and collaboration opportunities, which could then not only result in higher TRLs but also help the project's result become sustainable and usable long-term.

One of the challenges here also lies in the inconsistency of TRL reporting. While some projects clearly declare their intended or achieved TRL levels, many require manual estimation based on final deliverables, publications, or summaries. This limits the ability to assess overall technological impact and hinders transparent tracking of progress across funding cycles.

Even with limited reporting certainty, these findings underscore the importance of maintaining a balanced portfolio of low-, mid-, and high-TRL projects. Stronger continuity between discovery-oriented research and implementation-focused funding will be essential to ensure that promising tools and strategies developed through public investment can be validated and deployed in breeding practice. Additionally, introducing clearer requirements for TRL documentation in public project records would greatly improve monitoring and policy alignment in this area.

8. Species

A large share of projects are multi-species, so we apportioned each project's budget equally across the species it covered. This proportional allocation better reflects how resources may have been spread, even though it remains an approximation. Public summaries do not report a clear internal structure and financial breakdowns by species. This approach avoids any double counting of budgets, but it should be noted that a "primary" species of interest in a given project may still have received more attention in practice.

Using that method, the proportion of projects working on aquaculture leads across all FPs: ~60% in FP7, dipping to just under 50% in Horizon 2020, and rising again to ~60% in Horizon Europe (Figure 11). Cattle (dairy and beef) consistently ranks second. Poultry, pigs, and small ruminants (sheep, goats) sit in the middle, while insects appear as smaller but growing foci aligned with welfare, pollinator health, circular-bioeconomy, and alternative-protein agendas. Horses and more generic "livestock" groupings occur at low frequency and typically as minor components within broader trials.

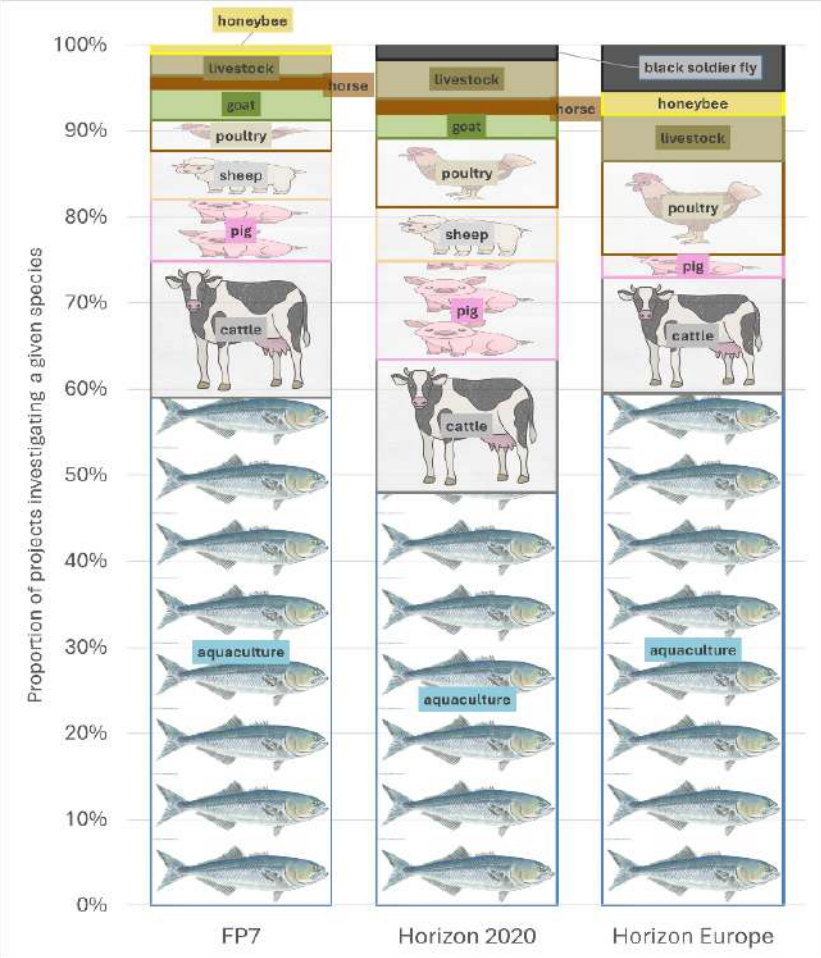


Figure 11: Proportion of projects that focused, at least in part, on the depicted species

In Figure 12, we see an interesting complementary trend to the one shown in Figure 11. Aquaculture's share of funding drops relative to its project share (€ 96.9 million in FP7, € 80.3 million in H2020 and € 19.2 million in HE so far). This is partially due to the fact that many aquaculture projects are smaller in scope. On the other hand, the share of cattle funding takes a bigger chunk (€ 60.5 million in FP7, € 38.9 million in H2020 and € 9.3 million in HE so far). The projects are larger, also because the trials are much more expensive compared to aquaculture. Cattle breeding is challenged by longer generation intervals (4-6 years for cattle and 1-4 in aquaculture[4]) and on-farm validation, which

[4] Jonas, E., & de Koning, D.-J. (2015). Genomic selection needs to be carefully assessed to meet specific requirements in livestock breeding programs. Frontiers in Genetics, 6, 49. DOI: 10.3389/fgene.2015.00049.

FAO. Inbreeding and brood stock management. FAO Fisheries Technical guidance/manual section.

means more funding is needed to complete a well-rounded project. We also see more diversification throughout time, as other livestock categories (the category includes rabbit, turkey, donkey and other bovine species) take up a bigger part of funding.

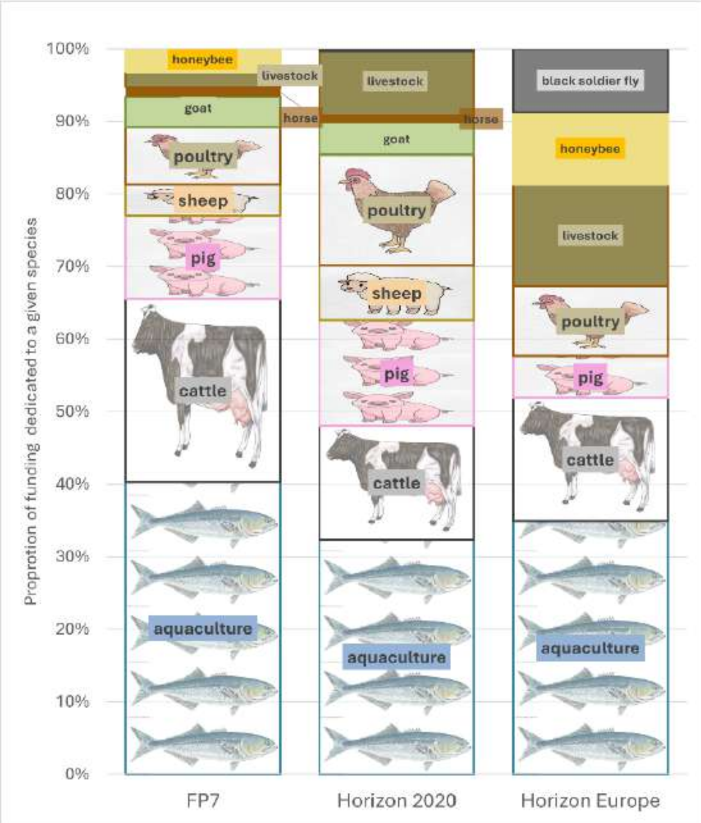


Figure 12: Proportional allocation of funding for a depicted species. If multiple species were investigated, the total funding was divided by the number of species.

Since aquaculture is incredibly diverse, we take a closer look into this subcategory. By funding, aquaculture remains concentrated in a few species: seabass €29.05m; seabream €27.38m; salmon €24.87m; trout €24.16m; carp €17.64m; tuna €14.33m; catfish €13.04m; oyster €10.34m; tilapia €7.68m; other species €27.98m. By projects, seabream (56) is most frequent, followed by seabass (23), Atlantic salmon (22), trout (22), carp (10), oyster (10), tilapia (6), and 35 other species (73) combined. Together with the figures, this shows breadth (over 60 species in total) but also clear priority clusters where genomic resources, disease-resistance work, and multi-trait selection are most mature. Aquaculture's dominance reflects strong market pull and cattle's steady second place mirrors long-running genomic evaluation systems. We also see emerging of insects (honeybee, black soldier fly) which might signal new welfare and sustainability directions.

9. Traits

One of the key objectives of this study was to understand which traits have been prioritised in publicly funded animal breeding projects across FP7, Horizon 2020, and Horizon Europe. Identifying these traits helps assess how research has responded to societal needs such as climate resilience, production efficiency, animal welfare, and sustainability. Projects have worked on a range of species and applied various breeding strategies to improve functional, production, environmental, economic, and welfare traits.

The traits reported in the projects are not always described in a consistent way, which required grouping them into broader categories for the purpose of this analysis. In many cases, especially in Horizon Europe projects, detailed reporting was missing or incomplete, so trait identification involved a degree of interpretation. Many different combinations of overviews can be produced, so this research focused on two categorisations. One by high-level trait categories (functional, production/economic, environmental, welfare) and one by more specific trait groups (e.g. reproduction, feed efficiency). Annex V provides the breakdown and definitions of different trait groups. The percentages reported below refer to projects that included at least one trait from the respective category. They should not be interpreted as exclusive categories, as a single project may have addressed traits from multiple categories. For example, a study targeting feed efficiency might also address welfare (e.g. satiety behaviour) and environmental impact (e.g. nitrogen excretion). GenTORE (H2020) targeted cattle robustness, integrating functional (fertility, disease resistance), environmental, and production traits (feed efficiency). Similarly, reproductive traits were sometimes studied alongside survival or adaptation. This underscores that trait classification, while helpful for analysis, does not fully reflect the multidimensional nature of breeding goals and the biological interdependence between traits.

Functional traits include reproduction, disease resistance, and longevity and were strongly represented: 32% of FP7 projects and Horizon 2020, and 57% in Horizon Europe targeted them, as seen in Figure 13. Within reproduction, traits such as fertility, sperm quality, viability, and cryopreservation were frequently studied.

Figure 13: Traits investigated in animal breeding projects. Please note that multiple traits could be investigated in one project, so this represents a percentage of projects that focused on a given trait to some extent.

Production and economic traits focus primarily on feed efficiency, growth, yield, and end-product quality. These were addressed by 39–44% of projects across the Framework Programmes, making this a consistently high-priority area.

Environmental traits included GHG emissions, nutrient efficiency (N, P), biomineralisation, methane output, and climate adaptation. Though not dominant, they maintained a steady presence. Welfare traits were a regular component of breeding objectives, covered by 17% of projects in FP7 and rising to 26% in Horizon Europe, indicating growing attention to animal well-being in breeding strategies.

In FP7, production and economic traits were dominant (around 38%), often linked to growth and feed efficiency in pigs, poultry, and cattle. By Horizon Europe, there's a marked rise in functional and welfare traits, especially in ruminants and aquaculture, with a stronger focus on resilience, robustness, and reproductive efficiency. Especially interesting is the rise in technologies used to minimize culling, related to reproduction, maturation and sex determination. This shift mirrors industry, and policy demands for sustainability and resilience, aligning with climate and animal welfare objectives. Despite shifts in focus, reproduction and feed efficiency were stable core targets. Their persistence reflects their economic relevance and genetic complexity, as well as their ties to both sustainability and profitability.

Welfare traits were often described through proxies: behavioural indicators, leg health, mortality, or resilience. The lack of harmonised phenotypes makes cross-project comparisons difficult, yet the increasing number of projects citing welfare as a goal, especially in Horizon Europe, is a sign of changing priorities. Around 15% of projects in FP7 and H2020 and 26% in Horizon Europe focused at least in part on welfare traits.

Trait selection is also strongly species-dependent. In aquaculture, disease resistance and environmental adaptation (e.g. salinity or temperature tolerance) were key, due to high mortality risk and climate vulnerability. Ruminant projects focused on traits like feed efficiency, methane reduction, and milk yield, often using genomic selection and sensor-based phenotyping. Pig and poultry projects targeted growth rate, feed conversion, and carcass quality, although welfare and robustness traits have become more prominent in recent years, particularly under Horizon Europe.

Trait improvements were commonly approached through modern breeding tools such as SNP genotyping, GWAS, and genomic selection. Many projects also introduced or relied on novel phenotyping technologies for hard-to-measure traits like individual feed intake, methane emissions, or behaviour. Functional traits related to reproduction frequently involved cryopreservation, sperm viability studies, and biodiversity conservation, especially in projects focused on long-term genetic resource management. These traits were often historically hard to select for, but new tools now make them more accessible. Aquaculture breeding programmes appear to lead in the use of genetic markers for disease resistance, as shown in AquaIMPACT and AquaFAANG. These projects addressed traits like resistance to viral nervous necrosis in sea bass. These traits are difficult to improve without genomic support due to high mortality and limited traditional recording.

Across species and trait categories, projects that reached higher TRLs (6–9) almost always used genomic prediction, GWAS, or multi-omics. This indicates that trait improvement is now largely genomics driven.

Despite their relevance, some trait areas are underexplored. Longevity and survival, which are important both from economical and welfare perspective, are rarely addressed directly, likely due to the complexity and time required for data collection.

10. Outcomes

Outcomes are determined based on reported data. The details included in these reports vary greatly and definitive claims about results and outcomes cannot be made. For better comparisons across programmes, reporting of outcomes should be better streamlined. Additionally, most projects define multiple objectives in the beginning but then do not report on the status or whether they fulfilled and achieved them in the final reports. For instance, a single project could develop genomic tools, optimise a breeding programme, and generate software or protocols. However, the reporting might focus only on the maturity of the breeding programme, for example. This reflects the integrative nature of modern breeding research. In practice, very few projects worked in a single outcome silo.

Where a project clearly produced multiple outcomes, the total project funding was divided equally across those outcomes for the purpose of this report. This does not imply that each outcome received an identical share of the budget. Rather, it provides a cautious estimation method that avoids over-attributing funding to individual outcomes or introducing unsupported assumptions. These outcomes were grouped into 13 overarching categories (from roughly initial 100), which means that one can look into each of these 13 with much more granularity.

Across all FPs, the most frequently reported outcomes were tools as seen in Figure 14: markers, models, and bioinformatics (26% of FP7 outcomes, 22% in Horizon 2020, and 20% in Horizon Europe). These include QTL identification, SNP panels, statistical models for genomic prediction, and decision-support tools. They are foundational for nearly all trait-related advances, especially in projects addressing complex traits like fertility, resilience, or methane emissions.

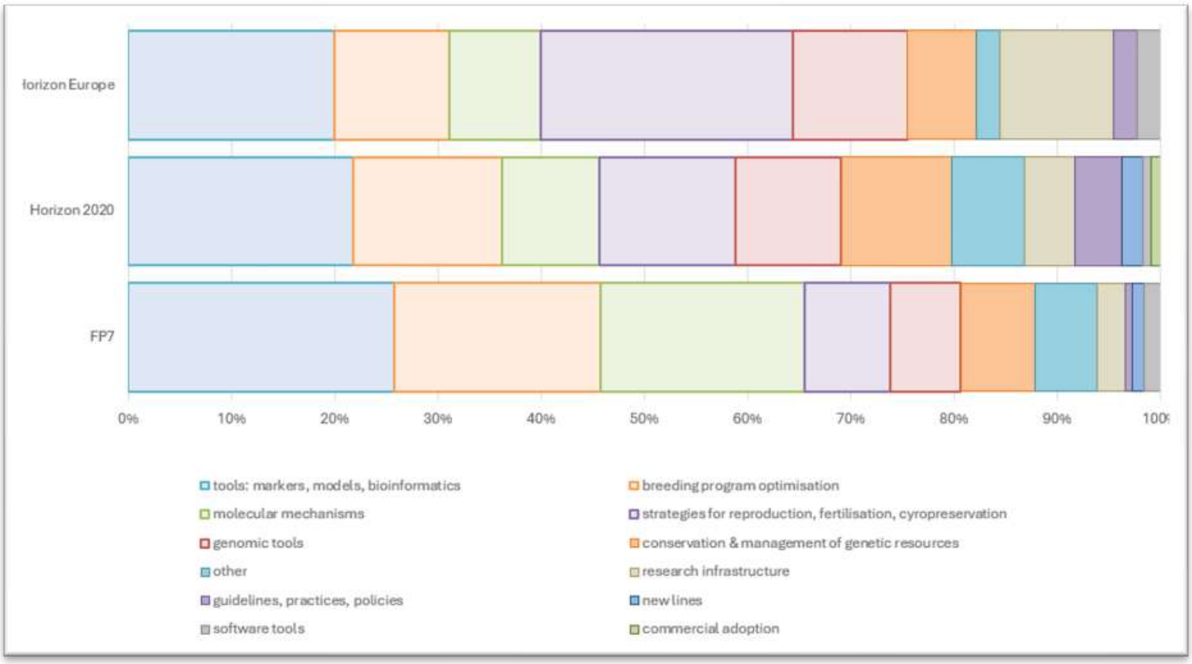


Figure 14: Proportion of projects which worked on specific outcomes. Many projects worked on multiple at the same time.

Outcomes related to breeding programme design and optimisation represented 20% of FP7 and 14% of Horizon 2020 outcomes. This includes protocols for selection index improvement, management of inbreeding, and integration of genomic tools into routine practice. These results are critical for translating basic research into field-level impact.

Roughly 10–20% of outcomes were focused on molecular mechanisms (e.g., gene regulation, immune pathways, epigenetic modulation). These outcomes were especially common in FP7, reflecting earlier-stage research, and less prevalent in Horizon Europe, where projects increasingly target application-level results.

Reproduction, fertilisation, and cryopreservation strategies became more prominent in later programmes, with 24% of Horizon Europe outcomes in this area. These include semen handling, oocyte cryopreservation, synchronisation protocols, and fertility optimisation, particularly in ruminants and aquaculture.

Genomic tools (e.g., high-throughput genotyping, sequencing platforms, imputation pipelines) accounted for 7–11% of outcomes across FPs. These tools underpin many other outcomes and are key enablers for trait selection and diversity conservation.

Some outcomes were less common but strategically significant:

- Research infrastructure (e.g. phenotyping platforms, data repositories)

- Guidelines and policies (e.g. breeding standards, animal welfare protocols)
- New lines and software tools for on-farm or institutional use
- Commercial adoption appeared in only two Horizon 2020 projects—highlighting a gap between research and market uptake

Projects achieving TRL 6 or above almost always involved applied genomic tools, such as marker panels or imputation pipelines. Examples include AQUA-IMPACT, which developed commercial selection tools for aquaculture species, and GenTORE, which used genomic data to support robustness and efficiency traits in cattle. These tools were directly tied to measurable trait improvement.

There are many species-driven outcomes: Aquaculture projects frequently delivered molecular tools (e.g. GWAS results, resistance markers) and reproductive protocols (e.g. gamete handling, cryopreservation). Cattle projects yielded genomic evaluation software and breeding indices, with strong links to trait modelling and selection tools. Pigs and poultry projects produced outcomes in growth optimisation, welfare protocols, and genomic prediction models.

While fewer in number, conservation-related projects were very productive in terms of outcomes. This included particularly gene banking protocols, population management strategies, and trait characterisation for native breeds. These outcomes are less visible commercially but vital for long-term genetic diversity.

Despite numerous technical outcomes, commercial adoption was rare and poorly documented. Only two Horizon 2020 projects explicitly stated downstream use in breeding companies. This suggests a disconnect between public R&I outputs and private sector uptake. This could possibly be due to IP concerns, insufficient validation, or regulatory hurdles.

11. Other projects

A separate category of projects was identified through various co-funding actions — including ERA-GAS, BiodivAgri, FACCE ERA-NET+, BiodivClim, and BiodivDynamics — yielding 58 projects outside the Framework Programmes. More recently, the European Partnership on Animal Health and Welfare (EUPAHW), launched in 2024 under Horizon Europe and coordinated by Ghent University, represents the EU's most ambitious initiative in this space. With a total budget of EUR 360 million over seven years, 90 participating organisations across 24 countries, and a portfolio of over 50 joint research projects, EUPAHW signals a significant step-change in the scale and coordination of European animal health and welfare research, which does not necessarily include breeding. However, the partnership currently provides only general information on funded projects, without disclosing detailed partner-level financing or results data.

For the 58 co-funded projects, information on TRL, outcomes, and trait categories was often unavailable or too incomplete to support a robust analysis. These projects are therefore best interpreted through the more consistently available variables: species coverage and consortium composition.

Several notable differences emerge compared with the Framework Programme projects. The species focus was more concentrated, with projects more frequently addressing a single animal species rather than several in parallel. Most projects focused on terrestrial animals — 54 out of 58 — while only four addressed aquatic species. Pigs, sheep, and cattle were the most frequently represented species groups. The ruminant category shown in Figure 15 also includes goats, though the majority of projects focused on cattle (both beef and dairy).

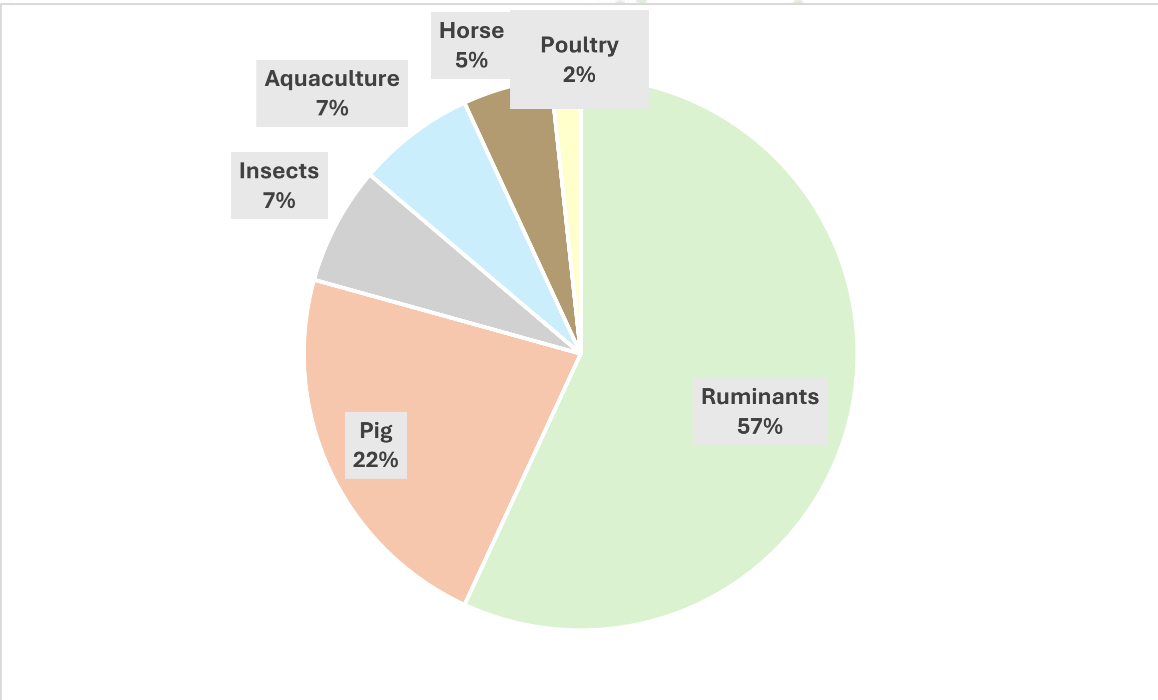


Figure 15: Species investigated in projects funded outside the Framework Programmes

The consortium structure also differed markedly from the main Framework Programme dataset. Private partners (192 participants) outnumbered public partners (99 participants), reflecting a stronger role for practice-oriented actors. Farmers were particularly prominent, representing around 29% of all participants, while research organisations accounted for approximately 33% (Figure 16). Other partner types included industrial actors, associations, consultancies, NGOs, and a small number of breeding companies. Taken together, this suggests that these projects were more closely connected to applied breeding, farming practice and sector-level implementation — even where detailed research outputs could not be assessed.

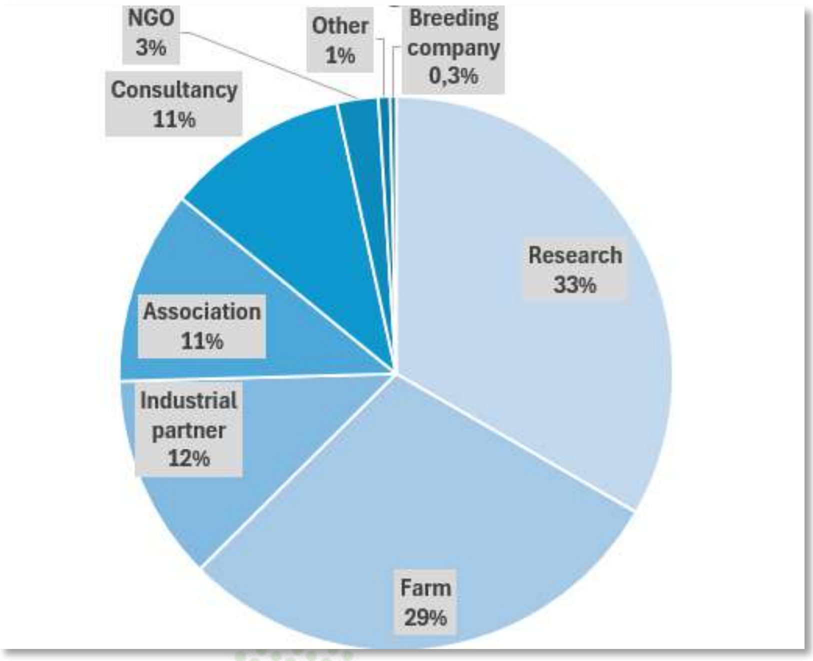


Figure 16: Types of organisations participating in the 58 identified projects

The geographical distribution of partners also differed from the main dataset described in previous chapters. Spain had the highest number of participating partners, followed by Poland, Italy, Germany, France and Slovenia.

12. Conclusion

This report focuses primarily on the EU Framework Programmes; FP7, Horizon 2020, and Horizon Europe; because they are, by a significant margin, the main source of public R&I investment in animal breeding in Europe. Other funding mechanisms do exist: ERA-NET co-funded actions, national programmes, and Structural Funds. But as the 58 projects captured in Annex II illustrate, these channels are not investing substantially in animal breeding research. Their scope is narrower, their budgets smaller, and their orientation is more practice-based than scientific. The picture this report draws is therefore not a methodological choice, it reflects reality.

Within the Framework Programmes, seven findings emerge consistently from the data:

1. Funding share declining. Total FP budgets grew 43%, but animal breeding's proportional share almost halved, sharpest in early Horizon Europe.

2. HE severely underfunded. EUR 54.9M committed to 23 HE projects to date, vs EUR 242M (FP7) and EUR 254M (H2020). The directional signal is unmistakable.
3. Research shifting to earlier stages. 41% of projects sit at TRL 1–3; only 13% reach TRL 6+. The pipeline from discovery to farm-level application remains thin.
4. Consortia growing, funding thinner. Average consortium size increased across programmes while average partner allocation stayed flat; resources are spread progressively thinner.
5. Aquaculture: broad presence, limited depth. Aquaculture appears in 50–60% of projects across all FPs, but funding concentrates in a handful of salmonid and sea bream/bass species.
6. Functional traits gaining ground. Functional traits (disease resistance, reproduction, welfare) grew from 32% of project focus in FP7 to 57% in Horizon Europe, reflecting shifting policy priorities.
7. Commercial translation remains rare. Only 2 H2020 projects documented commercial adoption of outputs; a persistent and structural research-to-farm gap.

The launch of EUPAHW in 2024, with its EUR 360 million total budget, represents a structural shift in how the EU organises animal research. However, EUPAHW's mandate is centred on animal health and welfare, disease prevention, biosecurity, and welfare standards. It does not cover the broader spectrum of animal breeding R&I: genomic selection, reproductive technologies, feed efficiency, climate adaptation breeding, or genetic resource conservation. These remain dependent on dedicated Framework Programme calls that, as this report shows, are themselves in decline. How EUPAHW and direct FP funding interact and whether one is quietly substituting for the other; will be a critical question for the next programming period.

This mapping exercise provides a factual baseline against which future investment patterns can be tracked and the contribution of public R&I to European animal breeding competitiveness can be assessed, supporting the work of EFFAB and the FABRE Technology Platform in advocating for science-based, evidence-driven policy for all European animal farming systems.

Annex I

Framework Programme Projects

208 projects across FP7, Horizon 2020, and Horizon Europe

Projects grouped by funding period and sub-programme area. Colour denotes the type of research activity.

94	91	23	208
FP7 2007–2013	Horizon 2020 2014–2020	Horizon Europe 2021–2025	Total

Framework Programme 7 (2007-2013)

94 projects

ERC / Ideas

5 projects

1 SELSWEEP
2 GENEWELL
3 DAMONA
4 ANGIOPLACE
5 BATESON

MSCA / People

38 projects

6 NEUTRADAPT
7 PIGSNP
8 SelectionForWelfare
9 SHEEPMILKGENES
10 UNICATTLE ID
11 INNATELYBETTERCOWS
12 GREENHOUSEMILK
13 InnatelyBetterCows2
14 CATTLECON IKTA
15 BEHENT
16 HORSEDOMESTICATION
17 SEQSEL
18 NUEMARKER
19 SheepRep
20 EXCELMEAT
21 NEMATODESYSTEMHEALTH
22 HERPISH
23 CONFLICTS
24 PASSA
25 FISHINUTRIGEN
26 COBIAGENE
27 AQUAPHAGE
28 LARVDEVOPTI
29 CACHE
30 DENUGREC
31 FISHPROBIO
32 CRYOGERM
33 CHLAFISH
34 LONGFA
35 FishPROG
36 REPRO-SWIM
37 miRTrout

38	MACE	39	GLUCOSE USE IN FISH
40	FISHSTRESS	41	PRO-OVUM
42	NEUROBASS	43	COD LARVAL SURVIVAL

Food & Research

33 projects

44	FISHBOOST	45	QUANTOMICS
46	LOWINPUTBREEDS	47	NEXTGEN
48	GPLUSE	49	GENE2FARM
50	ROBUSTMILK	51	ECO-FCE
52	PROLIFIC	53	FECUND
54	3SR	55	DIVERSIFY
56	SOLID	57	RUMINOMICS
58	PROHEALTH	59	COPEWELL
60	PEGASUS	61	AQUATRACE
62	LIFECYCLE	63	ARRAINA
64	SELFDOTT	65	COFASP
66	PRO-EEL	67	PREVENT ESCAPE
68	WELFARE INDICATORS	69	EADGENE_S
70	MULTISWARD	71	INTERPLAY
72	SMARTBEES	73	MACROSYS
74	TRANSDOTT	75	ASFRISK
76	EU-PLF		

Industry & SME

12 projects

77	HORSEGENE	78	PROSPAWN
79	PIGENDEF	80	FLOCK-REPROD
81	REPROSEL	82	OYSTERECOVER
83	SETTLE	84	ENRICH
85	SUDEVAB	86	SPACETASTE

87	SALMOTRIP	88	BOVINOSE

Capacities / SEWP
6 projects

89	ANIMBIOGEN IN EU	90	ERIN
91	ROSA	92	AQUAEXCEL
93	AQUAREDPOT	94	ECOAQUA

Horizon 2020 (2014-2020)
91 projects

ERC / Ideas
12 projects

95	AncestralWeave	96	PEGASUS (H2020)
97	EPIMARK	98	PALAEOFARM
99	BOSADMIX	100	TRANSGENE
101	ELONGAN	102	EPIFISH
103	PorCSperM	104	RuMicroPlas
105	The BoS	106	PLASTINET

MSCA / People
31 projects

107	ENDANGEREDHORSES	108	CHICKENSTRESS
109	TURKEY	110	Bioinformatics4Breeding
111	AdaptClim	112	MARKTHEPIG
113	ASF_SwineResistance	114	TRAINEd
115	MonoGutHealth	116	HEALTHYFOETUS
117	REP-BIOTECH	118	MetaPlat
119	M-P Communication	120	YAKUT
121	NUTREPHEALTH	122	MarkEfficiency
123	ALLOEM	124	SAFE-Aqua
125	Reprogram	126	HappyFish
127	GTHREG	128	IMPRESS
129	ResisGal	130	INDITOL

131	NEUROSHELL	132	WildFishGenes
133	SPARTEVs	134	TOXOSHEEP
135	DAMAGE	136	EUROVA
137	EXORep		

Food & Research

31 projects

138	TREASURE	139	Feed-a-Gene
140	IMAGE	141	SMARTER
142	iSAGE	143	GEroNIMO
144	BovReg	145	GenTORE
146	AquaIMPACT	147	RUMIGEN
148	GENE-SWitCH	149	PPILOW
150	SusAn	151	EuroSheep
152	SWINE-GEN	153	AQUA-FAANG
154	NewTechAqua	155	PerformFISH
156	FutureEUAqua	157	GenRes Bridge
158	iFishIENCi	159	SheepNet
160	SQS	161	EDU
162	IFASA	163	ProDairyWelfare
164	VIVALDI	165	SILGEN
166	MedAID	167	mEATquality
168	3D-omics		

Industry & SME

8 projects

169	PLATYPIS	170	CHiPInB
171	OF vacancy	172	EASYFISH
173	InOvotive	174	ECOEXTENDER
175	eggXYt	176	EGGR

Capacities / SEWP

6 projects

177	AQUAEXCEL2020	178	SEARMET
179	SmartCow	180	AGRICYGEN
181	AQUAEXCEL3.0	182	pp2EMBRC

Industry & SME
2 projects

183	GLOMICAVE	184	SilGen

Capacities / SEWP
1 projects

185	CRYO-FISH

Horizon Europe (2021-2025, partial)
23 projects

ERC / Ideas
3 projects

186	EPIAQUA	187	EPISELECT
188	DIASTORE		

MSCA / People
7 projects

189	DEMyo	190	PEZ
191	SalmoScales	192	CRYOCHICK
193	BullNet	194	CryoStore
195	sc-LAB2FATE		

Food & Research
6 projects

196	Re-Livestock	197	BeeGuards
198	Cure4Aqua	199	IGNITION
200	EUAqua.Org	201	Digi4Live

Industry & SME
4 projects

202	Omegga	203	Orbem Genus
204	FarmInsect	205	FreezeM

Capacities / SEWP
2 projects

206 EuroFAANG

207 EPIHERD

Capacities / SEWP 1 projects

208 GRINNAQUA

Annex II

Projects Funded Outside Framework Programmes

58 projects co-funded through ERA-NETs, JPIs, and other EU mechanisms

EU co-funded projects that operate alongside but outside the main Framework Programmes.

ERA-GAS

1 projects

1	RumenPredict

BiodivERsA

3 projects

2	BEEHOPE	4	GenClim
5	RESERVEBENEFIT		

FACCE

1 projects

3	ClimGen

EU CAP

53 projects

6	MERVEL	7	DIGITAL MONITORING OF HORSES IN SEMI-FREEDOM FOR THE OPTIMIZATION OF BREEDING AND TRANSFORMATION PROCESSES IN EXTENSIVE LIVESTOCK FARMS
8	Development of innovative breeding and feeding strategies for the preservation and utilization of valuable breed traits	9	Innovative methods of sheep breeding and breeding in the light of changing climatic conditions of Lower Silesia
10	Investigation of moulting and endoparasite load as well as preparation of a breeding value estimation in Saxon poultry breeds ("Dresdnerhuhn")	11	Evaluation and optimization of reproductive performance in the Avileña-Negra Ibérica Livestock
12	Selekt-Zucht-BSF-Futter	13	BIO4TRACE
14	LIVESTOCK PRECISION FARMING TO INCREASE RESILIENCE AND SUSTAINABILITY IN SPANISH PUREBRED BEEF CATTLE (AVILEÑA NEGRA IBERICA)	15	Innovative methods of cattle breeding in order to obtain the best quality beef from Lower Silesia
16	Strengthen the consistency between selection of Manech black head breed and systems of Basque mountain to revive a new collective race dynamic	17	OPERATIONAL GROUP: CREATION OF MARKETING AND EXPORT STRUCTURE OF GENETIC MATERIAL
18	SIMUNOR Bovine herd Normandy Simulation Tool	19	GO_ INMUNOGEN INTEGRATION OF GENETIC SELECTION ASSISTED BY IMMUNOCOMPETENCE MARKERS IN DAIRY AND BEEF SELECTION PROGRAMS
20	The Tuscan calf: innovative growth strategies (VITOSCA)	21	GENORIP - Development of a genomic tool for the management of reproduction and inbreeding control in dairy cattle
22	Increasing the activity and competitiveness of beef cattle farms through innovative reproduction monitoring	23	Increasing pedigree value and productivity of Lithuanian dairy and beef cattle populations and sheep flocks using innovative biotechnologies

24	Optimising the use of resources and reducing the environmental impact in different pig genetics (OPTIPORC)
25	Development of new technologies for bull sperm sex selection and fertility management
26	Animal welfare, nutrient and climate efficiency in Angler cattle
27	BIVALVI
28	Elaboration of the adequacy of the cattle embryo biopsy method under operating conditions, creation of the testing laboratory necessary for implementation
29	Family method of pig breeding
30	DNA mapping; the road to reduced methane emissions
31	Individual settings of consumption and conversion of feed in pigs and estimation of breeding value
32	OVIMPROVE: IMPROVING THE FERTILITY OF ARTIFICIAL INSEMINATION, COMPETITIVENESS AND BIOSECURITY OF MANCHEGO SHEEP FARMS IN CASTILLA LA MANCHA
33	Development of an innovative - mobile andrology laboratory and creation of a semen bank for Hucul and Małopolska stallions
34	Sex-sorting of bull semen, using innovative technology
35	Breeding for undocked pigs and a reduced risk of tail injuries
36	BEENOMIX 2.0 - Genomics and Sustainability in Beekeeping
37	Implementation of national genomic breeding value evaluation for Slovenian Brown Swiss and Holstein cattle population with combined reference populations
38	Testing and selection of female bovine animals on the A2 beta casein genotype for the production of functional milk products with higher added value
39	Breeding concept of endangered regional pig breeds for modern keeping systems focusing on animal welfare, reduced losses and improve animal vitality
40	OviData Increasing sheep genetic gain in Ireland through scientific data capture and analysis
41	PRODUCTION AND TRANSFER OF BOVINE EMBRYOS OBTAINED BY FIV
42	Improvement of Reproductive Aspects in Ovine Farms of Castilla y Leon
43	THE USE OF GENETIC RESOURCES THROUGH ITS SUSTAINABLE INCORPORATION TO THE VALUE CHAIN OF THE IBERIAN PIG
44	Improvement of the competitiveness of the crossed Iberian pig of Extremadura raised in the field through the analysis of the proteolytic potential
45	Q-OLOR: strategies for obtaining pork free of boar taint
46	Selection of Duroc pigs for a traditional and distinguished pork production model (Rodapork)
47	Implementation of genomic selection in dairy cattle of the Community of Madrid
48	GENDUROC - Authentication of Duroc breed pork products using genetic markers
49	Innovative tools to support the beekeeping sector for the enhancement of local ecotipe bees and associated productions - InnovApe
50	The key problem that this project will address is the inherently slow rate of genetic improvement in dairy cattle on the female side.
51	Improvement of Bavarian piglet production with sustainable and animal welfare oriented selection in closed-herd farms
52	Creation of a center for the production of genotyped embryos - EMBRYOGEN
53	Digitization of the Performance test for Animal Genetic Resources - Precision Animal breeding
54	OPERATIONAL GROUP: CREATION OF MARKETING AND EXPORT STRUCTURE OF GENETIC MATERIAL
55	OPERATIONAL GROUP REPROVI: Implementation of reproductive solutions to increase the economic sustainability of dairy sheep farms.

56	Schleswig Coldblood maintenance breeding - Development of modern methods for the maintenance breeding of the Schleswig draft horse in Schleswig-Holstein
57	REDYBLACK : a new genetic model to meet the expectations of the industry and the consumer while improving competitiveness and sustainability of breeding
58	BESTBROOD

Annex III

Framework Programme Architecture

How sub-programme areas map across FP7, Horizon 2020, and Horizon Europe

Different funding periods use different names for equivalent research areas. This table maps the report's classification labels to the official structure of each Framework Programme.

Category	FP7 2007–2013	Horizon 2020 2014–2020	Horizon Europe 2021–2027
Agrifood	Cooperation — Food, Agriculture and Fisheries and Biotechnology	Societal Challenges 2 — Food security, sustainable agriculture and forestry, marine and maritime research and the bioeconomy	Pillar II — Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment
MSCA	People — Marie Skłodowska-Curie Actions	Excellent Science — Marie Skłodowska-Curie Actions	Pillar I — Marie Skłodowska-Curie Actions
ERC	Ideas — European Research Council	Excellent Science — European Research Council	Pillar I — European Research Council
Industrial / SME	Cooperation — Industrial Leadership; Research for the benefit of SMEs	Industrial Leadership — Innovation in SMEs; LEIT	Pillar III — Innovative Europe (EIC Accelerator, EIC Pathfinder)
Capacities / Widening	Capacities — Research Potential; Research Infrastructures	Spreading Excellence and Widening Participation; Research Infrastructures	Pillar III — Widening Participation and Strengthening the ERA

Annex IV

Technology Readiness Level (TRL) Scale

Definition used in Horizon 2020 — General Annex G

TRL measures technology maturity from basic research (TRL 1) to full commercial deployment (TRL 9). It is the standard classification used across all Horizon programme projects.

1 Basic Principles Observed

Scientific research begins to be translated into applied R&D. Examples include paper studies of a technology's basic properties.

2 Technology Concept Formulated

Invention begins. Practical applications can be identified but remain speculative and unvalidated.

3 Experimental Proof of Concept

Active R&D is initiated. Includes analytical studies and laboratory validation of separate elements.

4 Technology Validated in Lab

Basic technological components are integrated to establish they will work together. Low fidelity relative to the eventual system.

5 Technology Validated in Relevant Environment

Basic components are integrated with realistic supporting elements and tested in a simulated environment.

6 Technology Demonstrated in Relevant Environment

Representative model or prototype is tested in a relevant environment. Major step up in demonstrated readiness.

7 System Prototype in Operational Environment

Prototype near or at planned operational system, demonstrated in an operational environment.

8 System Complete and Qualified

Technology proven to work in its final form and under expected conditions. End of true system development.

9 Actual System Proven in Operational Environment

Actual application in final form and under mission conditions, including operational test and evaluation.

Annex V

Project Classification System

Projects are classified along two dimensions: the breeding trait targeted (A) and the type of research outcome produced (B).

A. Trait Categories

Four groups covering the main breeding objectives addressed in the projects.

Functional

Physiological function, health, reproduction and survival traits underpinning long-term fitness.

EXAMPLES

Biomineralisation efficiency; cryopreservation success; digestion efficiency; disease detection; disease resistance; disease response; egg productivity; egg quality; embryo viability; fecundity; fertilisation efficiency; fertility rate; horseback anatomy; inbreeding control; larval survival; lipid metabolism improvement; udder health

Production and economic

Traits directly linked to quantity and quality of the marketed product (meat, milk, eggs, fish). Traits with a direct market or cost-efficiency dimension beyond production volume.

EXAMPLES

Body condition score; digestive efficiency; egg production; feed efficiency; feed intake; growth rate; maturation; meat quality; meat yield; milk fat; milk protein; milk quality; milk yield; nutrient absorption; nutritional profile; pollination efficiency; cost-effective AI protocols; product quality; seed availability; size uniformity; taste

Environmental

Traits relevant to the environmental footprint: GHG emissions, nutrient excretion, climate adaptation.

EXAMPLES

GHG emissions; N, P excretion; adaptation to acidification, temperature, salinity; climate resilience; heat tolerance; methane emissions; nitrogen efficiency; nitrogen emissions; resilience to pathogens; resource efficiency; stress resistance

Welfare

Animal well-being: behavioural indicators, longevity, health resilience, reduced painful practices.

EXAMPLES

Anti-inflammation; avoid beak trimming; avoid castration; behavioral response; castration reduction; deformities; disease predisposition; feather pecking; health traits; hernia/congenital defects; immune response; inbreeding control; maternal immune response; mortality; mothering traits

Annex V — B. Research Outcome Categories

How research outputs are categorised by type of knowledge or product produced.

Tools: markers, models, bioinformatics	Genomic selection pipelines, SNP chips, genotyping methods, functional genomic tools, molecular markers, GWAS results, QTL identification, MAS, biomarkers, candidate genes, statistical models for BV estimation
Breeding programme design	Breeding programme optimisation, breeding lines, selection index design, crossbreeding strategies, inbreeding control, breeding targets
Reproduction & cryopreservation	Cryopreservation protocols, fertilisation protocols, embryo transfer, IVF, semen and oocyte quality, biobanking, semen analysis, sex determination
Molecular mechanisms	Gene regulation, immune pathways, epigenetic markers, metabolic trait identification, multi-omics data, MAS
Genetic resources & conservation	Genetic characterisation, diversity management, gene bank protocols, epigenetic data base management
Genomic tools	Annotation of livestock genomes, genetic hotspots, genetic variation analysis, genotyping methods, genetic loci for TB resistance, genetic tool box for commercial species
Research infrastructure & databases	Phenotyping platforms, data repositories, networks, databases
Software tools	Machine learning platform, BV estimation software, welfare recording software
Guidelines, policies & training	Breeding standards, welfare protocols, ICAR guidelines, roadmaps, capacity building, training
New lines & breeds	New genetic lines, hybrid lines, isogenic lines
Commercial & market tools	Commercial adoption, market-ready applications
Other	Welfare strategies, social science outcomes, public perception studies, strategic agendas, feeding strategies, behavioural indicators, heat sensor

Annex VI

EU Funding by Country

Amounts adjusted to 2020 prices · World Bank GDP deflators

Total EU contributions to animal breeding R&I, ranked by country. Bar length shows the proportional share relative to the top-funded country.

All Framework Programmes Combined — Top 20 Countries

Rank	Country	Amount	Share
1	France	€70 776 710	**12.8%**
2	Spain	€63 457 902	**11.5%**
3	United Kingdom	€61 739 013	**11.2%**
4	Netherlands	€44 884 441	**8.1%**
5	Norway	€42 476 394	**7.7%**
6	Italy	€38 786 911	**7.0%**
7	Germany	€37 273 205	**6.8%**
8	Denmark	€34 216 055	**6.2%**
9	Belgium	€25 795 249	**4.7%**
10	Ireland	€21 736 040	**3.9%**
11	Greece	€18 948 019	**3.4%**
12	Sweden	€15 099 140	**2.7%**
13	Israel	€10 964 511	**2.0%**
14	Portugal	€10 798 423	**2.0%**
15	Finland	€9 842 327	**1.8%**
16	Switzerland	€7 540 245	**1.4%**
17	Austria	€6 263 748	**1.1%**
18	Hungary	€5 809 251	**1.1%**
19	Poland	€5 473 161	**1.0%**
20	Czechia	€4 485 305	**0.8%**

FP7 (2007–2013)

Rank	Country	Amount	Share
1	United Kingdom	€34 514 252	**14.3%**
2	France	€25 131 923	**10.4%**
3	Spain	€24 294 543	**10.0%**
4	Norway	€19 138 634	**7.9%**

5	Netherlands	€18 880 913	7.8%
6	Italy	€18 280 791	7.6%
7	Belgium	€15 355 839	6.3%
8	Denmark	€12 993 409	5.4%
9	Sweden	€11 761 234	4.9%
10	Ireland	€10 847 147	4.5%
11	Germany	€10 485 676	4.3%
12	Greece	€8 418 627	3.5%
13	Switzerland	€4 444 861	1.8%
14	Finland	€4 245 853	1.8%
15	Portugal	€3 763 981	1.6%
16	Poland	€2 657 081	1.1%
17	Austria	€2 638 304	1.1%
18	Hungary	€2 602 431	1.1%
19	Israel	€2 600 870	1.1%
20	Czechia	€2 215 266	0.9%

Horizon 2020 (2014–2020)

1	France	€42 076 565	16.6%
2	Spain	€30 872 301	12.2%
3	United Kingdom	€26 009 429	10.2%
4	Netherlands	€22 418 227	8.8%
5	Norway	€20 750 854	8.2%
6	Denmark	€18 504 458	7.3%
7	Italy	€16 682 011	6.6%
8	Germany	€14 304 691	5.6%
9	Belgium	€9 751 917	3.8%
10	Ireland	€8 776 491	3.5%
11	Greece	€8 693 048	3.4%
12	Israel	€5 994 143	2.4%
13	Finland	€4 189 334	1.6%

14	Hungary	€3 206 821	1.3%
15	Portugal	€3 151 882	1.2%
16	Switzerland	€3 095 383	1.2%
17	Austria	€2 911 406	1.1%
18	Sweden	€2 574 098	1.0%
19	Poland	€1 876 268	0.7%
20	Czechia	€1 657 938	0.7%

Horizon Europe (2021–2025, partial)

1	Germany	€12 482 839	22.7%
2	Spain	€8 291 058	15.1%
3	Portugal	€3 882 559	7.1%
4	Italy	€3 824 109	7.0%
5	Netherlands	€3 585 301	6.5%
6	France	€3 568 223	6.5%
7	Denmark	€2 718 189	4.9%
8	Norway	€2 586 906	4.7%
9	Israel	€2 369 498	4.3%
10	Ireland	€2 112 402	3.8%
11	Greece	€1 836 344	3.3%
12	Finland	€1 407 139	2.6%
13	United Kingdom	€1 215 332	2.2%
14	Poland	€939 811	1.7%
15	Sweden	€763 808	1.4%
16	Austria	€714 039	1.3%
17	Belgium	€687 494	1.3%
18	Czechia	€612 101	1.1%
19	Serbia	€385 000	0.7%
20	Slovenia	€297 760	0.5%

Annex VII Top Funded Organisations by Framework Programme

Research institutes and private companies with the highest EU contributions, adjusted to 2020 prices. All Frameworks shows top 10; individual Framework Programmes show top 3.

All Framework Programmes (FP7 + H2020 + HE combined)

Research Institutes & Universities — Top 10

Rank	Organisation	Country	EU contribution
1	INRAE (incl. INRAE TRANSFERT SAS)	France	€37,609,225
2	Wageningen University	Netherlands	€15,297,175
3	Stichting Wageningen Research	Netherlands	€14,476,433
4	University of Edinburgh	United Kingdom	€13,445,692
5	CSIC (incl. INIA)	Spain	€13,383,481
6	Aarhus Universitet	Denmark	€12,422,276
7	Københavns Universitet	Denmark	€9,858,156
8	Hellenic Centre for Marine Research	Greece	€9,469,715
9	Université de Liège	Belgium	€8,112,051
10	NMBU	Norway	€7,652,554

Private Companies & Industry Partners — Top 5

Rank	Organisation	Country	EU contribution
1	Parco Tecnologico Padano S.R.L.	Italy	€3,129,140
2	IN OVO HOLDING BV	Netherlands	€2,728,016
3	FARMINSECT GMBH	Germany	€2,499,999
4	ORBEM GMBH	Germany	€2,450,876
5	EGGXYT LTD	Israel	€2,447,672

FP7 — Seventh Framework Programme (2007–2013)

Research Institutes & Universities — Top 3

Rank	Organisation	Country	EU contribution
1	INRAE	France	€13,092,535
2	Wageningen University	Netherlands	€6,675,402
3	Aarhus Universitet	Denmark	€6,277,409

Private Companies & Industry Partners — Top 3

Rank	Organisation	Country	EU contribution
1	Parco Tecnologico Padano S.R.L.	Italy	€2,913,418
2	Genoskan A/S	Denmark	€1,230,160
3	Topigs Norsvin Research Center BV	Netherlands	€1,003,533

Horizon 2020 (2014–2020)

Research Institutes & Universities			Top 3
1	INRAE (incl. INRAE TRANSFERT SAS)	France	€22,417,704
2	University of Edinburgh	United Kingdom	€9,083,509
3	Københavns Universitet	Denmark	€7,555,961

Horizon Europe (2021–2025)

Research Institutes & Universities			Top 3
1	CSIC	Spain	€2,566,475
2	INRAE	France	€2,098,985
3	CIIMAR	Portugal	€1,599,128

Private Companies & Industry Partners			Top 3
1	FARMINSECT GmbH	Germany	€2,499,999
2	ORBEM GmbH	Germany	€2,450,876
3	OMEGGA GmbH	Germany	€2,432,150

Annex VIII Animal Species and Categories Covered

All animal species and production categories addressed in the identified projects, organised by terrestrial and aquatic systems.

Terrestrial species

20 species / categories

Beef cattle
Black soldier fly
Bovine species
Broiler chicken
Cattle
Chicken
Dairy cattle
Dairy goat
Donkey
Goat
Honeybee
Horse
Laying hens
Livestock
Pig
Poultry
Quail
Rabbit
Sheep
Turkey

Aquatic species

59 species / categories

Abalone
African catfish
Algarve nase
Amberjack
Atlantic bluefin tuna
Atlantic cod
Atlantic halibut
Atlantic herring
Atlantic salmon
Blue mussel
Brown trout
Carp
Catfish
Clam
Cobia
Cod
Crab
Demersal roundfish (seabream, cod)
Eel
European catfish
European eel
Farmed fish
Finfish
Flat oyster
Flatfish (sole, turbot, halibut)
Gilthead seabream
Great scallop
Grey mullet
Iberian minnowcarp
Macroalgae
Manila clam
Meagre
Mussel
Nile tilapia
Oyster
Pacific oyster
Pikeperch
Prawn
Rainbow trout
Salmon
Salmonids
Scallop
Sea urchin
Seabass
Seabream
Senegalese sole
Sharpsnout seabream
Shellfish
Shrimp
Sole
Sturgeon
Tilapia
Torgal chub
Trout
Turbot
Western riuvaco
Whiteleg shrimp
Wreckfish
Zebrafish

Annex IX

Private Sector Partner Types

Classification of private sector organisations in EU-funded animal breeding projects by activity type and market role.

Breeding companies

Companies specialised in genetic improvement, stud-book management and AI centres

TYPES:

Breeding companies with focus on goat · aquaculture · cattle · insect · pig · poultry · sheep

Aquaculture business

Commercial fish and shellfish production companies and hatcheries

TYPES:

Aquaculture company · Hatchery

Associations

Sector and trade associations representing breeding, livestock, aquaculture, organic, and agricultural sectors

TYPES:

Associations in agricultural sector · animal breeding · animal production · animal science · aqua · poultry · insect · aquaculture · beekeeping · cattle · certifying body · equine · farmers · goat · meat · organics · pig breeding · rabbit breeding · research · sheep breeding · sheep/goat breeding

Research and service companies

Private research organisations, genomics service providers and scientific consultancies

TYPES:

Research and service company

Consulting companies

Agricultural, environmental, aquaculture and engineering advisory firms

TYPES:

Consultancies in engineering · aquaculture · environment · research · agriculture

Technological companies

Technology developers for precision livestock farming, sensors and digital tools

TYPES:

Tech companies in animal breeding · aquaculture · livestock · bees · poultry

Biotechnological companies

Biotechnology firms and private laboratories (genomics, sequencing, molecular biology)

TYPES:

Biotech company · Laboratory

Agribusiness

Integrated agri-food businesses — animal health, feed, food and processing companies

TYPES:

Agribusiness · Animal health company · Aqua feed products · Feed company · Food company · Meat company

Farmers

Individual farms, farm cooperatives, beekeepers and aquaculture operations

TYPES:

Aquaculture company · Beekeeper · Farm · Farm dairy · Farm dairy goat · Goat farm/breeding company · Horse breeder · Horse farm · Research farm · Sheep farm/breeding company · Tourist farm

European Technology Platform

Industry-led European Technology Platforms representing sector strategic agendas

TYPES:

ETP

Other (Non-profit)

Non-profit organisations (conservation, food safety, environmental communication)

TYPES:

Non-profit · Non-profit conservation · Non-profit: environmental communication · Non-profit: food safety · Non-profit: research

Other

Residual private actors (retailers, seed companies, other)

TYPES:

Real-estate · Retailer · Seed company · Water supply company

Annex X

Price Adjustments and Inflation Methodology

All budgets in this report were adjusted to 2020 prices to ensure comparability across Framework Programmes. The annual inflation rate was referenced from the World Bank Group Data and the adjusting factors were calculated accordingly. Horizon 2020 and FP7 budgets were all adjusted with corresponding factors. The adjustment for Horizon Europe was needed only for a part of the overall budget calculations. As stated in the regulation relevant for Horizon Europe, certain areas were allocated additional funds in constant 2018 prices — therefore these top-ups were adjusted to reflect 2020 prices.

Annual Inflation Rates

Year	Rate (%)
2006	2.72%
2007	2.48%
2008	4.11%
2009	0.44%
2010	1.52%
2011	3.29%
2012	2.54%
2013	1.31%
2014	0.22%
2015	-0.09%
2016	0.17%
2017	1.38%
2018	1.69%
2019	1.44%
2020	**0.19%**
2021	2.49%
2022	8.47%
2023	5.78%
2024	2.80%

Source: World Bank Group — GDP deflator, Euro area.

Adjustment Factors Applied

FP7

2018–2020

×1.01631

adjustment factor

2020–2024

×1.20891

adjustment factor

H2020

2006–2020

×1.22672

adjustment factor

2013–2020

×1.05084

adjustment factor

Note: Horizon Europe top-ups in 2018 constant prices use the FP7 2018–2020 factor.

FABRE • TP
Farm Animal Breeding & Reproduction Technology Platform

WHAT IS FABRE TP?

The Farm Animal Breeding and Reproductive European Technology Platform (FABRE TP) is a forum led by knowledge institutes and academia collaborating with the private sector. It provides a platform to define research priorities for animal breeding, genetics and reproduction to accelerate the sustainability, competitiveness and resilience of all animal farming systems. The Platform is also active in promoting research and innovation in Aquaculture and Livestock Breeding and Reproduction.

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