Reaction on external review Breed4Food II

To further improve its performance, the Breed4Food consortium decided to organize an external review. Seeking further improvement is regarded vital for the consortium Breed4Food to maintain relevance and a leadership position. This external review was finalized in April 2021. According to the reviewers, "Breed4Food is a world-class initiative in the area of livestock breeding; an initiative which has delivered a number of successful outcomes, both scientific and commercial. There are few livestock programs internationally, which can boast successful collaboration of four commercial companies with a world-class university. The impact this has made on the livestock industry in the Netherlands, and internationally is tangible in many ways. The companies involved in Breed4Food have wide international reach - due to the nature of genetic improvement of livestock, improved genetics can be disseminated and scaled quickly around the world, creating considerable impact. The Breed4Food program has produced 63 peer reviewed papers in scientific journals, 86 conference contributions on (international) conferences and 5 PhD theses that have been successfully defended, while another 4 PhD students are ongoing. The Breed4Food program has operated with a mindset of continuous improvement. This is evident in the changes to the structure of the program to incorporate industry needs in terms of the discovery pipeline".

The opportunities for improvement which the reviewers have identified, fall into three main areas:

1. Strengthening a shared culture across the partnership;
2. Improving processes;
3. Societal impact and social license.

1. Strengthening a shared culture across the partnership

The reviewers expressed that the already realized shared culture can be enhanced. They recognized the challenges in doing this, multiple organizations with differing drivers, project leaders with many pulls on their time and a societal environment which is less supportive of livestock production than it has been in the past. For these reasons, they recommended that greater effort and energy needs to be placed into creating a shared culture than that required to do this within a single entity.

A) Integrated training/leadership program

The reviewers suggested a program of multiple (e.g., 4) one-week, residential modules over 12 months with high quality external delivery would provide the opportunity for peer-networks to be created across the companies and WUR. This would be of great value to individuals within the program as well as the partners.

Thus far, each of the companies and WUR have their own educational program for (young) employees and are opportunities for peer-networks limited to project meetings, Breed4Food seminars and scientific meetings (f.e. EAAP, WCGALP).

Reaction: It is recognized that a more integrated training program for employees of the partners does have added value when limited to specific topics such as technical programs or courses on project management. Leadership trainings and soft skill courses are considered the primary responsibility of each of the partners. Nevertheless, we will explore opportunities for researchers to follow trainings or courses on these topics in mixed groups with the additional benefit that they get to know each other and thereby strengthening a shared culture across the partnership.

B) Provide formal secondment opportunities

Many of the existing staff/student swaps - time spent outside of their main organization - are organized on a relatively informal basis. In some cases, young researchers were able to formally spend one day per week in their associated commercial organization which they said contributed greatly to their understanding of that organization's culture, needs and drivers as well as their project outcomes.

The reviewers would like to see more frequent and more formal secondment opportunities created for all involved (not just early-career researchers). These secondments could also be outside of the five core organizations and could be international – e.g., to learn specific technical skills in an internationally leading organization.

Reaction: The creation of frequent and more formal secondment opportunities for all involved (young) researchers will be further explored by the management of Breed4Food. Attention will be paid to writing down an overall ambition, involvement of experts outside Breed4Food and to create these secondment opportunities without creating new overhead and formal structures.

C) Increase Woven Threads

Breed4Food should also consider developing opportunities to promote greater informal interactions (woven threads) across its structures and across outside organizations to stimulate problem solving, cross-disciplinary collaboration and the development of new directions. The Consortium Manager should proactively seek ways to stimulate interactions across Breed4Food, from organizing travel groups to meetings to arranging "dinner meetings" for all participants across Breed4Food with invited (external) speakers. In addition to this, more across-campus inputs into student supervisory and exam committees should be considered to widen networks and increase awareness of developments in other fields.

Thus far, the informal interactions are limited to project meetings, Breed4Food seminars (biannual) and scientific meetings (f.e. EAAP, WCGALP).

Reaction: To stimulate more informal gatherings among (small) groups employees of the partners of Breed4Food is fully supported. We are reluctant to put a structure on the organisation of informal meetings. We will stimulate informal gatherings by sharing ideas and experiences of different ways to informally interact. It will be stimulated to have informal gathering (e.g. with a meal or a drink) after a formal meeting. This is viewed as a way to stimulate more informal meetings across researchers of the partners of Breed4Food.

2. Improving processes

The reviewers recommended improvements for the start of a project and the formal evaluation of a project. These are (partly) in line with the recommendations of the internal review which are presently being implemented. *Develop new processes around project selection and management that formalize and direct proposals to prepare for success.*

There are differences in how project leaders are selected and how projects are managed. This is to be expected given different personal management styles, but processes can be optimized with a more formal management process (which links to training, see Challenge #1). Consistency is important in such a significant collaboration and particularly for integrating two-way communication between commercial and academic needs and the bridge into discovery and application/implementation. One option would be to use a "contract" format (project management style) that identifies responsibilities beyond the research phase. The appointment of project co-leads may help address the weakness identified as one-directional communication or participation in projects. However, this should consider the entire pipeline from research to application. Involvement of "sponsors" responsible for application from the beginning of project creation can help drive research and development by keeping a focus on how results can be adopted.

Thus far, leaders (WUR) and co-leaders (companies) have been selected for each of the Work Packages (WP's) of Breed4Food III. Furthermore, an employee of each of the companies is assigned as contact person for each of the WP's.

Reaction: The first steps to implement the stronger involvement of the commercial partners has already been taken by appointing co-leaders from the companies for each of the Work Packages (WP) of the PPP Breed4Food III. This can be further strengthened by defining milestones, go – no go's, impact for business, etc. The realisation of all this has to take place while reducing efforts on other aspects to ensure that we do no increase the overhead of the consortium Breed4Food.

A) Formal performance evaluation

The majority of staff, if not all, within Breed4Food, should be incorporated within a formal performance evaluation framework at both WUR and the companies. The projects within the consortium are too important to be regarded as "an extra task" that gets in the way of "priority roles for the employing organization." Breed4Food projects should have equal weighting for participating staff together with their other roles and be recognized as such by all partners.

Thus far, the evaluation of the involved project leaders and members of the project teams is the responsibility of WUR and the companies where they are employed.

Reaction: The formal performance evaluation of all researchers involved in Breed4Food is considered the responsibility of each of the individual partners. Prior to the formal performance evaluation, the responsible management of each of the partners will more actively seek input about the performance of the researcher within Breed4Food. It is suggested that each of the partners add the work for Breed4Food in the job description and/or evaluation form of researchers with a significant role in Breed4Food.

3. Societal Impact and social license

The partners of Breed4Food demonstrated strong awareness of the different challenges animal improvement faces in the future. Awareness of societal challenges were also clear amongst the commercial partners and there was some recognition that addressing these challenges is not easy from a commercial standpoint, without wider support from society and with the vexed question of "who pays?" Awareness of the issues across the consortium did not lead to the issues being addressed or prioritized at the consortium level. Examples include a failure to develop a coherent engagement strategy to address social license and a failure to broaden cross-disciplinarity problem solving (within the core activity). The "flexible component" of the consortium may be used to help address this, however, the partners may prefer to address this independently. If addressed independently by the partners, that may miss an opportunity for a proactive collective effort that utilizes the strength of Breed4Food.

Genetic improvement is positioned at the base of the value chain (or supply chain). As such, breeders understand that they must be "ahead of the curve" with regards to trait selection and improvement as it may take some years for changes to reach production parts of the value chain. For this same reason, those involved in genetic improvement are naturally able to take a leadership role in determining priorities for genetic improvement and determining alternate models (genetic/production or business models) for rolling out genetically improved livestock nationally and internationally. This leadership position can extend to incorporation of cross-disciplinary collaboration.

A. Precompetitive collaboration for social license

As is the case for areas such as food safety and animal health, social license for genetic improvement may be regarded as "pre-competitive" rather than opportunities for competitive advantage; at least in terms of strategy.

i. Expand connections with key groups e.g., the Ministry of Agriculture, Nature and Food quality, LTO Nederland, Dutch Society for the Protection of Animals and others (including other PPPs) to develop a truly functional forum to plan and address societal needs in the future. Develop new project activity focused on this area to include social scientists (including economists) as well as technical researchers. Review previous initiatives (e.g. Code EFABAR) to investigate results in terms of creating open dialogue and shared values with society (addressing both local and international perspectives).

Thus far, WP5 'Ethics & Society' is included in Breed4Food III. Also, a 'Scientific & Implementation advisory board' is part of the proposed organisation Breed4Food III.

Reaction: The value of collaboration for social license is recognized. However, it is less clear on the added value of a new forum to plan and address societal needs by Breed4Food. The partners played an active role in the 'Initiative group Sustainable Breeding (*Initiatiefgroep Duurzame Fokkerij*)'. This initiative ended in 2018 and we should put effort in reconciling the lessons learned. The opportunities of collaboration will be further explored within WP 5 'Ethics & Society' of the PPP Breed4Food III. Furthermore, it will be explored in what way the topic 'precompetitive collaboration for social license' can be addressed in the 'Scientific & Implementation advisory board' which will be installed as part of the next phase of Breed4Food.

ii. Investigate how to develop communication vehicles to society by integrating different skillsets and approaches (including the arts) – NWO and TKI A&F support these aspects so that Breed4Food should make it a priority to survey what is available and relevant to address wider stakeholder engagement.

iii. Once benchmarking is complete then the Board should discuss a plan to win new funding from agencies to address this gap. (Note: A similar approach should be considered to create support for investment into "process innovation" (Challenge 2) required to enhance consortium effectiveness)

iv. The Breed4Food WUR team needs to ensure they are at the centre of strategic planning within WUR and the future of agriculture in order to identify synergies, opportunities for cross-cutting programs, and alignment with society's concerns. This will help Breed4Food take a proactive approach to sector transition and the necessary social license.

Reaction: The value of communication is recognized. Before taking additional initiatives it will be explored how such a new initiative relates to the involvement in the European Forum of Farm Animal Breeders (EFFAB), and public relation activities of the five partners. Within this context, Breed4Food will pick up its role based on the work of WP5 'Ethics & Society' of the PPP Breed4Food III. Breed4Food recognizes its role with respect to 'centre of strategic planning'. This covers a wide domain which not only involves the core of Breed4Food but also the phenotypic research in the flexible zone which involves other departments of Wageningen University & Research, other universities, research institutes and companies. The relevance of staying involved in a pro-active way in the dialogue of the strategic themes of the livestock sectors is recognized as relevant for all partners of the consortium Breed4Food.

B. Urgency in future innovations

All Breed4Food people interviewed were acutely aware of the challenges facing animal protein production companies due to societal perceptions around climate change and animal welfare. The early-career researchers were perhaps the most concerned and conflicted. It would be of value to have some of these early career researchers involved in society consultation, debate and development of new initiatives. Key areas/activities which could be further developed are as follows:

i. Assessing models by which commercial entities are rewarded for addressing societal values, e.g., slow growing poultry was cited as an example where consumers pay more for the shift in production efficiency on the basis of better welfare and eating quality. This model will not fit all improvement scenarios. What other supply-chain models, including government involvement, could be integrated to ensure initiatives are developed which lower environmental footprints, improve animal welfare and resilience (especially in the face of climate change) and enhance the healthiness/quality of animal protein in human diets?

Thus far, the proposed improvements in the supply chain can be addressed by one or more of the partners in other programs outside the core of Breed4Food. Information exchange with the non-involved partners can be facilitated when these programs are accepted for the flexible zone of the consortium Breed4Food.

Reaction: The Breed4Food partners are aware of the need to interact with other players in the animal protein production chain. Partners have implemented the exchange of information between involved and non-involved partners of programs in the flexible zone Breed4Food. It will be explored how this can be extended to other players. Breed4Food recognizes it responsibility to engage in dialogue to present genetics as one of the solutions for societal challenges in livestock production. The value of involving young researchers is recognized and will be taken up.

ii. Scientists often find it hard to incorporate more qualitative, social science activities into scientific programs and decision making. In terms of genetic improvement, the

main area where social scientists were integrated into Breed4Food was in the area of gene editing. This is an important inclusion, but gene editing is still a minor proportion of the livestock breeding industry and greater efforts need to be made to integrate social science into other parts of the program to help in finding animal breeding solutions which will be embraced by wider society and allow for greater transparency around production systems.

Comment: (see A i)

iii. Insects offer potential in both human and livestock diets. Existing and new livestock breeding tools and technologies can be applied to insect breeding to improve production efficiency and healthfulness. We would like to see a small pilot program within Breed4Food III which scopes out the opportunities, pathways and science required for integrated insect breeding and production systems.

Thus far, the public knowledge of animal breeding and genomics is used f.e. in bee breeding by former department head Prof. Pim Brascamp. WUR-entities other than WUR-ABG are also involved in setting up a research program for the insect sector f.e. larvae of the soldier fly.

Reaction: Some of the commercial partners and WUR-ABG are already involved in research on 'insect breeding' outside the consortium Breed4Food. For WUR, it is one of the strategic themes as part of the strategic plan 'Finding answers together 2019–2022'. Hendrix Genetics is involved in genetic improvement program for insects. We, therefore, do not see the added value of starting a small pilot program 'insect breeding'. Development of programs such as start-up/problem solving weekends to encourage early-career scientists, across multiple disciplines, to develop ideas and solutions which could be integrated into animal production systems to address societal concerns. In order to attract bright, young innovators (across disciplines) prizes/awards could be included as well as inclusion of the entrepreneurial business sector (outside of the well-established existing animal protein sector). The best idea/s could then be assessed by WUR/companies for commercialization feasibility.

Thus far, the development of 'bright ideas' has been part of Breed4Food II financed by the so-called TKI-toeslag. Looking back, this has in one case resulted in breakthrough scientific achievements and business applications.

Reaction: Based on experiences in recent years, we will definitely continue facilitating research on bright ideas by young researchers. This is also included in the agile way of working in the WP's which will be used in Breed4Food III. In addition, we plan to set aside funds for working on 'bright ideas' outside the core of the consortium Breed4Food. It has proven to be an effective way for stimulating the creativity and engagement of (young) researchers in research.

(Wageningen, 15 July'21)