SAFSD Restructuring Proposal

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EMT Science 5th Sept 2023

Overview

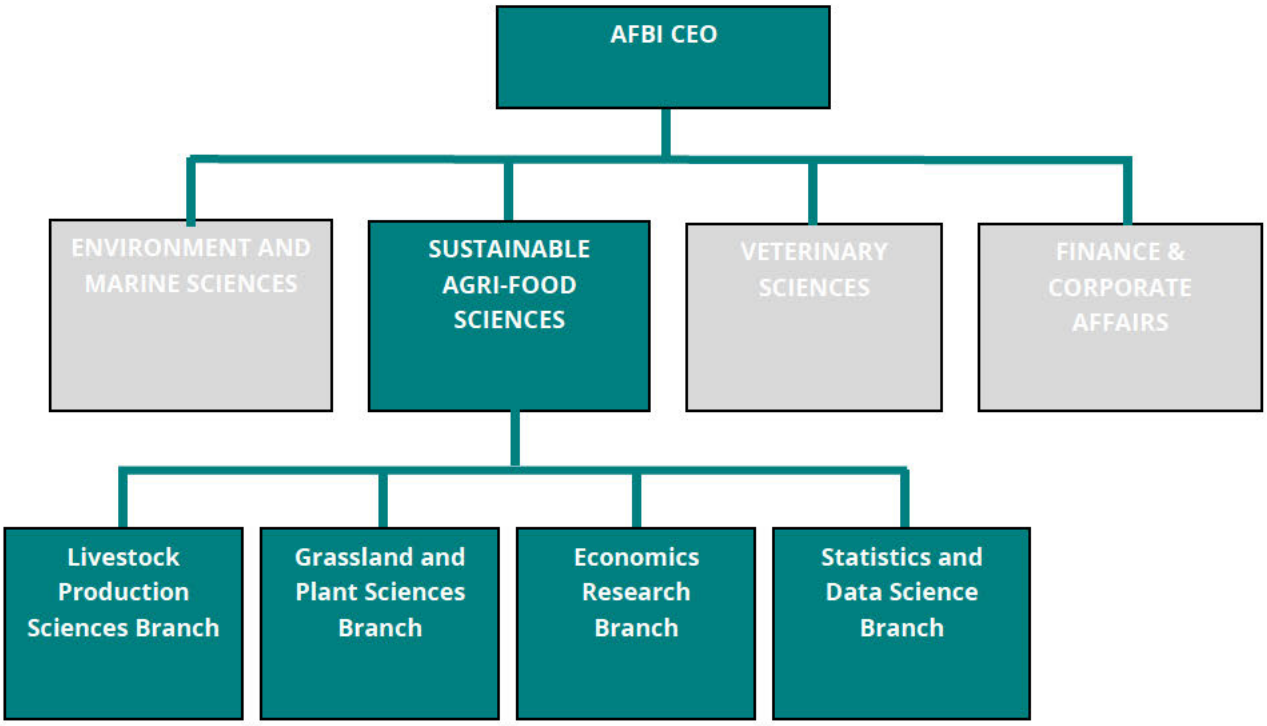
This paper provides a high level overview of the current and future proposed SAFSD structure. It's main purpose is to request permission to progress with the splitting of the GPS branch into two branches, one with a focus on plant health and the second with a focus on agronomy (i.e. with a focus on plant production and it's interaction with soil systems).

1. Sustainable Agri-Food Sciences Division (SAFSD) consists of around 190 staff (including fixed term (and excluding food research branch)) and about 20 PhD students. The majority of staff are located at AFBI Hillsborough (Livestock Production Sciences Branch (LPS)) (~90), with ~ 20 at Newforge in Economics Research Branch, five in Statistics and Data Science Branch and ~ 35 within Plant Health within Grassland and Plants Sciences Branch (GPS). A further ~ 15 staff are located at Loughgall from GPS and approximately 25 at AFBI Crossnacreevy from within GPS.

2. The Divisional Office is currently based in AFBI Newforge but plans are underway to relocate to AFBI Hillsborough.

3. The majority of SAFSD work is dedicated to research, mainly for DAERA but also with other collaborators under various funding mechanisms. SAFSD arguably is the most industry facing of AFBI's three science divisions. Recently the amount of non-statutory work has been reduced with plans to reduce it further so far as possible. This leaves the majority of 'scientific services' work within SAFSD aligned with statutory testing in the areas of plant health and seed testing. [redacted]

4. The current branch structure at SAFSD consists of 4 science branches and a Divisional Management Unit.



[redacted]

6. [redacted] However, it is recognized that [redacted] and GPS are significant branches in terms of size and complexity being multisite.

[redacted]

[redacted]

[redacted]

9. With regard to GPS, it is proposed to split GPS into two branches: One with a focus on Plant health (i.e. the plant health team of ~ 35 FTE based in AFBI Newforge) and the second with a focus on 'Agronomy' (i.e. the teams at Crossnacreevy and Loughgall who focus on grassland and arable systems). There is also an option to transfer the grassland science team from LPS into this new 'Agronomy' branch (name to be discussed) which would provide complementarity to the Loughgall and Crossnacreevy work. Grassland and arable represents 76% of land use in Northern Ireland. While this is likely to reduce slightly with an increase in forestry predicted, land for food production, based on current agricultural policy, will remain the predominant land use in Northern Ireland in the coming years. As such the combination of these teams with a renewed focus on the way we use and management land in NI, in collaboration with AEB, have the skills and expertise to address the vast majority of land use in Northern Ireland into the future. This grassland team will also start to explore the adoption of silvo pasture for livestock going forward as an evolved way of using land for livestock systems into the future. Furthermore, co-cropping using a range of crop types, including trees, legumes, cereals and herbage species offers resilient and productive options for land use and management, soil and environmental health while supporting food production and the economy.

10. The names of the branches have yet to be confirmed.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

15. [redacted]

[redacted]

16. **Remit of Plant Health sciences would include**
    a. their statutory work in support of DAERA legislative requirements
    b. emergency response capability for plant, bee and vector-borne diseases
    c. research - DAERA E&I project delivery (~3-4 projects live per year). Research topics include
        i. Plant health
        ii. Integrated pest management
        iii. Bee health
        iv. Invasive species
        v. Vectors of livestock diseases

    [redacted]

    e. 3-4 PhD studentships active at any one time

Rationale for Branch status

There has been increasing focus on Plant Health in recent years. Outbreaks of *Phytophthora* and ash dieback diseases have led to significant tree deaths, which have changed the appearance of the landscape. There is evidence that with climate change the threats from non-native pests and diseases of plants will increase. Correspondingly, there have been several legislative changes that have increased the scope of Plant Health. Implementation of the 'Plant Health Law' Regulation (EU) 2016/2031 in 2019 has effectively doubled the plant health surveillance work of the Branch. In addition, EU-Exit has required greater liaison with DAERA, DAFM, DEFRA and the EU, with respect to Sanitary and Phytosanitary (SPS) measures protecting Ireland's (North and South) high plant health status. Divergence between EU and GB on plant health issues are likely to require expert scientific advice at a senior level from AFBI to DAERA and to the Minister. Similarly, the Branch provides advice to DAERA on the use of pesticides and implementation of integrated pest management (the latter a requirement under the Sustainable Use Directive 2009/128/EC). [redacted]

Plant Health staff form a cohesive unit within GPS and are quite distinctive in terms of remit, locality (all at Newforge) and DAERA liaison. [redacted] In addition to plant health, the unit also does significant work on pesticide usage monitoring, bee health, invasive species, earthworms and monitoring of vectors of livestock diseases.

Options for strategic development of Plant Health Branch

There are a number of options for the strategic development of the proposed Plant Health Branch. Staff within the Branch have been developing new techniques to survey and monitor pests and diseases. For example, we currently have eDNA (environmental DNA) projects (E&I, DAERA/DAFM and a studentship) to provide early detection of pests and pathogens in forests and invasive species in the horticultural trade. Such techniques combined with

pheromone trapping, drone surveillance and machine learning identification of pests and diseases, have great potential to forewarn of potential problems before outbreaks. These techniques coupled with spatial analyses can also aid in precision agriculture, minimizing the amount of agrochemicals applied to control native pests. There is therefore an overlap within the Branch between plant health, integrated pest management and the safeguarding of biodiversity within the agroecosystem. Much of the expertise within the Branch in terms of surveillance techniques, morphological identification and molecular diagnoses could be extended to monitor insect, earthworm and nematode biodiversity.

Although the Branch is predominantly plant health, there are many aspects of our work that have a significant animal health dimension. Following the outbreak of bluetongue disease in north-western Europe in 2006, we started working on *Culicoides* midges that vector the bluetongue virus. This work ultimately changed European legislation on the movement of livestock during a bluetongue outbreak (Bluetongue Regulation 1266/2007). We are also currently monitoring mosquitoes at ports, as the invasive Asian tiger mosquito is spreading through Europe. Bee health, although now sitting with Plant Health in DAERA, is legislated under Animal Health. We have a remit to monitor statutory bee pests and diseases, in particular foulbrood diseases, and invasive pests such as small hive beetle (in Italy) and Asian hornet (in GB). Many of the pathways and legislation safeguarding plant health are similar to animal health, and there are opportunities for greater synergies for research under a One-Health banner (compare Animal and Plant Health Agency in GB).

- In summary, there is a valid remit for the Plant health team to represent a stand alone Branch within AFBI and for this branch to develop it's strategic direction in a number of ways. These include, and are not exclusively independent: Retention in SAFSD will maintain strong linkages in AFBI plant protection, e.g., pest and disease management research and soil health research on earthworms with Crossnacreevy/Loughgall/Hillsborough.
- Plant Health to EMSD has potential to enhance the terrestrial biodiversity group, e.g., create a 'Plant Health and Biodiversity Branch'.
- Plant Health to VSD has potential benefits in terms of a One-Health approach, similar legislative responses (e.g. SPS requirements), bee health now under Animal Health Law and synergies with VSD work on vector-borne diseases and disease epidemiology.

SAFSD HoD is open to discussions with regard to the best alignment of 'Plant Health' into the future.

17. Remit of the 'Agronomy' Branch would include:

a. The grass genetics programme at Loughgall [redacted]

b. The statutory seed and variety testing work in support of DAERA legislative requirements:
   i. DUS ([redacted]
   ii. VCU ([redacted]
   iii. Seed Testing [redacted]

c. Use of alternative manures/fertilizer substrates including Peat replacements programme
d. Current Research projects
    i. Innovations in plant variety testing (EC H2020)
    ii. Soil Health (E&I)
    iii. Future grass genetics Research (E&I)
    iv. Impact of conventional manures and novel products on plant and soil (E&I)
    v. Mycotox-I: Fusarium in Irish cereals (DAFM/DAERA)
    vi. Beyond Peat: Peat replacement (DAFM/DAERA)

Rationale for Branch Status

The vision for the branch is to build on the current foundations of grass breeding and technologies for seed testing (e.g. genomics and phenomics) (set out below) but also examine and optimize the introduction of alternative plant systems such as alternative cereals, multi species swards and agro-forestry to support wider farm ecosystems and produce food while reducing the environmental impact of producing that food. The branch would consider optimum fertilizer types and regimes for such systems as well to promote soil health and productivity.

Plant breeding, plant and seed testing, and agronomy are essential for optimising land use and management. What is grown on the land, in terms of species, varieties and seed quality, and how that land is managed, is key to meeting productivity and environmental goals. This forms the basis for the new Land Use and Management Branch. This new Branch will have a focus on plants for use in agricultural and food systems, their management and innovations to optimize their productivity whilst also maximizing their ability to support soil and environmental health.

The AFBI forage grass breeding programme at Loughgall has been breeding grass varieties for > 70 years. Since 1998, 39 improved forage grass varieties have entered variety recommended lists around the UK and Ireland, at a rate of 1.5 per year. Twenty-one AFBI-bred varieties are currently on UK RL's, highlighting the longevity and robustness of AFBI varieties to perform consistently across different regions.

AFBI Crossnacreevy has been conducting statutory testing of herbage and cereal varieties for > 50 years and Seed Testing in Northern Ireland has just past it's 100-year anniversary. Realtime testing of varieties to determine if they are novel and merit Plant Breeders' Rights ensures new germplasm is reaching market every year.

AFBI Crossnacreevy has conducted Herbage DUS for several decades, the work is highly specialised following specific protocols laid down by UPOV (https://www.upov.int/portal/index.html). The relevant legislation is laid out in the UK Plant Varieties Act 1997, with the associated Plant Breeders' Rights Regulations 1998 (further details are available at www.gov.uk/guidance/national-lists-of-agricultural-and-vegetable-crops). In the UK, the DUS tests are co-ordinated by the Plant Varieties and Seeds Office (PVRO) of the Animal and Plant Health Agency (APHA is an agency of the Department for Environment, Food and Rural Affairs, Defra), on behalf of the four UK country regions.

Performance testing of plant varieties provides essential information on varieties' value for cultivation and use. This work is covered by the Seeds (National List of Varieties) Regulations 2001, Seeds (Variety Lists) Regulations (Northern Ireland) 2020 and AFBI Crossnacreevy conduct this in a range of herbage and cereal species. Following Brexit, National Listing in NI is now a devolved task and separate National Lists exist for GB and NI.

The Official Seed Testing Station (OSTS) for Northern Ireland is in its 100th year and is responsible for conducting Statutory Seed and Certification for Northern Ireland. It is one of three OSTS in the UK, the other two being in Scotland (SASA) an England (NIAB). The Northern Ireland OSTS is an ISTA (International Seed Testing Association) designated laboratory and follows ISTA protocols. Statutory seed testing and certification is carried out according to The Seeds Act (Northern Ireland) 1965 (as amended) and The Seed Marketing Regulations (Northern Ireland) 2016 (Statutory Rule no. 2016/244). Certified seed of known varieties with high germination and largely free of weed seeds ensure that crops sown in Northern Ireland establish well and contribute to profitable and sustainable yields.

Associated with the Statutory work carried out at Crossnacreevy, is a requirement for AFBI senior staff to participate in multiple working groups and committees on behalf of DAERA to represent NI. This enables NI to:

a. take part in discussion and agreement of UK Policy and Strategy in plant varieties and seeds,
b. contribute to UPOV International working group on plant variety protection for agricultural crop varieties,
c. contribute to discussion for a for the ex-situ maintenance of UK plant genetic resources, and
a. develop testing procedures and making variety recommendations to UK National List and Seeds Committee. participate in the organisation of UK National Listing and Seed Certification,
b. provide independent expert opinion on the VCU of forage and cereal varieties entered for UK (NI and GB) National Listing.
c. participate in discussion and agreement of UK Policy and Strategy in plant varieties and seeds.

Agronomy encompasses the science and technology of producing and using plants by agriculture for a range of end uses. It includes plant and soil science. Working with AEB, this new Branch will have a focus on soil health, especially biological characteristics, and evaluating the impact of what is applied to and grown in the soil. The DAERA Soil Health and Manure in Arable projects have developed ways to measure the impact of land management practices on soil health. Associated with this is the peat replacement programme work at AFBI Loughgall looking for mitigations against the loss of peat in horticulture.

The work of AFBI Crossnacreevy and Loughgall are closely aligned and form a cohesive unit as well as working across Branch and Divisions within AFBI.

Options for strategic development of the 'Agronomy' Branch

The staff of the proposed branch have complementary expertise in plant (cereal and grass) breeding, testing, soil science, genomics, phenomics and manipulation of organic matter. The strategic plan will incorporate:

- *Genomics in grass breeding and plant variety testing:* Staff from Loughgall have been actively developing expertise in selecting varieties for root traits to mitigate against climate change. Introduction of genomics into plant breeding has begun with proposals for DAERA E&I and DAFM/DAERA funding for PhD students and post-doctoral researchers. In addition, a DAERA PhD, co-supervised by grass breeder at Loughgall and geneticist at Crossnacreevy will look at using genomics to mitigate against the impacts of climate change on NI grass production. In addition, the InnoVar project is preparing ground for the use of genomics in plant variety testing.
- *Peat replacement:* Staff at Loughgall have extensive composting experience. This has led to their success in DAFM/DAERA project 'Beyond Peat' with potential for expanding grant income.
- *Soil microbiome:* Building on soil health projects, the branch has submitted proposals to SFI Co-center and DAFM/DAERA funding streams to determine the impact of land use on the soil microbiome. The InnoVar project has demonstrated varietal impact on soil biological processes and an ambition will be to tailor varieties to growing scenarios based on their impact on the soil microbiome.
- *Novel/new crops:* PhD student will be looking at the establishment of an agronomic tool kit to enhance the commercial cultivation of mallow plant species for the production of value-added animal feed materials; evaluation of protein crop varieties for Ireland (SFI proposal); use of protein/cereal co-crops as potential silage and impact on soil health (DAFM/DAERA proposal; Peace Plus proposal)
- *Land Use Long-term Strategic Platform:* There is potential to develop a strategic research platform at AFBI Crossnacreevy that will enable research work on a range of topics including: impact of novel products on plant and soil; GHG emissions associated with land use change; pathogen loading due to organic manure use; ΔC with land use.
- Phenomics in plant testing: The InnoVar project has provided an opportunity for AFBI staff to upskill in phenomics. The intention is to utilise this expertise to drive efficiencies in statutory work.

SAFSD HoD would welcome discussions with regard to the inclusion of other plant based expertise within AFBI into this branch e.g. Agro-Forestry.

As noted above the establishment of this branch, working in collaboration with AEB colleagues as well as LPS and ERB will contribute significantly to AFBI's strategic goals. It will also build on work already underway to investigate a land use strategy for Northern Ireland which considers the use of land to produce food, ensure the optimum use of manures, traditional and novel, while protecting the environment and generating an economic return from the land.

It is proposed to establish this branch structure now. [redacted]

[redacted]

Recommendation:

To approve the splitting of GPS into 2 branches, one with a focus on plant health and one with a focus on plant systems and their agronomy.