All-Party Parliamentary Group on Science and Technology in Agriculture

Notes of a Zoom Meeting held on Wednesday 16 March 2022

Hosted by NIAB, Cambridge

UK pulses - fostering innovation to unlock sustainability, healthy eating and climate change benefits

In attendance:

Members:
Julian Sturdy MP (Chair)
Earl of Devon
Lord Taylor of Holbeach
Lord Carrington

Guest speakers:
Roger Vickers, Chief Executive, PGRO
Professor Lars Østergaard, Group Leader, John Innes Centre
Elena Walden, Policy Manager, Good Food Institute (GFI) Europe
Dr Richard Harrison, Director of Cambridge Crop Research, NIAB

Stakeholders:
Prof Jim Dunwell, Reading University; Megan Gittoes, British Sugar; Jaine Chisholm-Caunt, GAFTA; Hugh Oliver-Bellasis, NIAB EMR; Jim Duncumb, Syngenta; David Lloyd, Germinal; Dr Julian Little, JLC; Helen Riordan, Defra; Anthony Hopkins, NFU; Prof Jane Langdale, Oxford University; Prof Sir David Baulcombe, Cambridge University; Prof Huw Jones, Aberystwyth University; Phil Howell, NIAB; Eva Sharpe, JIC; Jon Williams, BASF; Prof Eric Holub, Warwick University; Prof Jonathan Jones, TSL; Prof Brendon Noble, Westminster University; Jennie Wilson, US Embassy; Prof Richard Napier, Warwick University; Emily Leggatt, Burpee; Jane Smernicki, Agri-EPI Centre; Dr Alastair Leake, GWCT; Prof Tina Barsby, Cambridge University; Judith Batchelar, Food Matters Intl; Pete Ianetta, James Hutton Institute; Julian Smith, RRes; John Shropshire, G's; Jonathan Clarke, JIC; Agnieszka Konkolewska, Teagasc; Nick Anderson, Velcourt; Prof Giles Oldroyd, CCC; Lisa Hulshof, BASF; David Exwood, NFU; Allie Hesketh, NFU; Sanu Arora, JIC; Tom Wilkinson, ADAS; Charlotte White, ADAS; Jim Morton, Syngenta; Sheila Alves, Teagasc; Colin Peters, NIAB; Peter Fox, Dalton Seeds; Chris Guest, LSPB; Michael Shuldham, LSPB; James Wallace, IAR Agri; Peter Gadd, NFU; Tom Wood, NIAB; Abhi Sarkar, NIAB; Jack Ward, British Growers Assn; Ed Barker, AIC; Matt Culley, NFU; Mark Nightingale, Elsoms; Adrian Hayler, Elsoms; Jane Thomas, NIAB; Fiona Short, CIEL; Liz Scott, NIAB; Laurel Gilbert, Defra; Samantha Brooke, BSPB; Bethan Postle, NIAB; Daniel Pearsall, Group Co-ordinator.

1. Introduction

Welcoming members, guest speakers and stakeholders to the All-Party Group's third meeting of 2022, Julian Sturdy (JS) introduced the topic for discussion, noting that the opportunities to unlock the potential of home-grown pulses was raised briefly at the Group's previous meeting

with Defra chief scientific adviser Professor Gideon Henderson, who highlighted the importance of harnessing the 'genetic richness' of pulses and legumes as nitrogen-fixing crops, beneficial for soils and important as a versatile source of home-grown protein for both humans and livestock.

However, JS noted that the Group had also previously heard from guest speakers that pulses are neglected crops in terms of private sector plant breeding and applied research activity, and that a co-ordinated, strategic R&D programme is urgently needed to deliver on the very real environmental, economic and climate change opportunities on offer. He added that this critical area of research had assumed an even greater significance in recent weeks with the unfolding crisis in Ukraine and the heightened concerns over future protein, grain and fertiliser supplies and prices, and a meeting to explore these issues was therefore extremely timely.

2. Guest speakers

[Please note that speakers' slide presentations are available to download via the meetings section of the All-Party Group website at www.appg-agscience.org.uk]

Roger Vickers, Chief Executive, PGRO

Introducing the topic Roger Vickers (RV), chief executive of UK levy-funded pulse research organisation PGRO, described the status of field peas and beans as niche crops in the UK, covering just 4.5% of the arable area and dwarfed by major crops such as wheat and barley.

He noted that pulses and vegetable legumes are also orphan crops internationally with comparatively low levels of investment in R&D - orders of magnitude less than for major commodity crops. Global investment in pulse and legume R&D is estimated at $175m annually vs. $ billions for other crops.

RV added that this niche crop status inhibits investment which perpetuates continued lack of market interest – a kind of market failure, and yet the future national and international opportunities are huge. He added that while peas and beans in the UK are the main focus, other pulses could work here if their potential was developed.

RV described the UK market for dry peas (c. 170k tonnes) – split into four different types (green, yellow, marrowfat and maple) with different food end uses and markets, or used for animal feed where quality parameters for human consumption markets are not met. Green peas have the most flexibility for marketing, while yellow peas are the dominant type internationally and of most interest for fractionation - but with a relatively small UK market.

Field beans (faba) is a larger UK crop than peas (c. 800k tonnes), with increasing interest from animal and aquaculture feed markets at home and abroad, and with a human consumption export market in North Africa. Not generally consumed in significant quantities in the UK as food, although vegetable broad.beans is a niche market.

Other uses for peas and beans include certified and farm-saved seed production, as well as crops grown and fed on-farm.

To set UK production of pulses in context, RV noted that Canada produced more than 4.5 million tonnes of peas alone in 2021.

Summarising why pulses remain as niche crops, RV suggested that farmers and industry tend to follow what makes them money, and associated policy guides action and entrenches behaviour in the market. RV also highlighted the PGRO publication 'Blueprint for UK pulses in post-Brexit world' setting out a positive vision for the sector, available at https://www.pgro.org/blueprint-for-uk-pulses/.

Discussing the development of the UK pulse crop area in the context of historical farm policy changes and political developments, RV focused on CAP greening reforms from 2013 and the introduction of the three-crop rule, which initially led to a significant increase in UK pulse plantings, but this fell away again in 2017 when EFA rule changes prohibited the use of agrochemicals – demonstrating the strong influence of policy changes on cropping patterns.

RV noted that Brexit in 2019 coincided with a subsequent rise in the pulse area but this was actually driven by two very wet autumn/winters that restricted autumn sowing and pushed growers into spring crops. Two poor harvest years dampened enthusiasm, reflected in a flattening of the upward trend in 2021.

By contrast the 2021 harvest was very good but RV suggested it is difficult to predict what the UK crop area will be in 2022. He added that the world is entering very uncertain times with the ongoing Ukraine conflict, noting that both Russia and Ukraine are very large pea producing regions.

Turning to the market opportunities and benefits, RV emphasised that pulses have very strong environmental credentials, enabling improved crop rotations and diversification with benefits for biodiversity both above and below ground. Pulse crops also improve soil structure, fertility and ultimately arable resilience, while the zero nitrogen fertiliser requirement and residual N left for subsequent crops offers major climate change advantages - no GHG emissions from N fertiliser production for pulse cropping.

RV added that home-grown proteins can help offset the UK's protein imbalance with high volume soya imports often from areas of the world that are less environmentally aware or conscientious – eg in terms of deforestation, shipping.

RV emphasised that consuming pulses also confers many health benefits, highlighting the need for clear education and that taking a dietary lead policy of promoting legumes will be positively realised in reduced NHS costs – eg through improvements in health conditions such as diabetes and coronary heart disease, and by addressing the obesity crisis.

RV highlighted areas in which new markets for pulse-based food (and plastic alternative) products are emerging, but he emphasised that these opportunities need encouragement and support. With increasing demand for pulse protein, especially in the USA and trending to Europe, he noted that large investments in extraction capability are taking place in France and Canada, but not in the UK, while imports of pulse-based snacks are also increasing. RV warned that with no significant investment in real added value taking place in the UK, in contrast to other countries, there was a risk of the UK missing out on these new market opportunities.

Summarising the existing barriers to unlocking the potential of UK pulses, RV cited:

- Poor data re. supply and demand, which hampers new market development and investment;

- Niche crop status, which inhibits investment and market development. A chicken and egg market failure and a genuine case for policy intervention;

- Policy focus on major crops continues, to the detriment of niche crops, by entrenching the status quo and vested interests;

- Reduced agchem availability, variable crop quality and slow development of new markets.

RV added that increased policy emphasis on the environment must also take account of the need for continued food production, especially given the current geopolitical instability. He

stressed that pulses can address this, giving farmers the opportunity to both improve the environment AND produce food simultaneously and profitably.

In conclusion, RV noted that pulses offer the opportunity to deliver public good from agriculture, ticking all the boxes of the political moment in terms of sustainable farming, climate change and healthy eating and, in view of the genuine barriers to development identified, a clear case of market failure requiring and deserving of political intervention.

Professor Lars Østergaard, Group Leader, John Innes Centre

In providing an overview of early-stage trait discovery in pulses, Lars Østergaard (LO) set out his aim to describe how biological research and technology development can help overcome some of the barriers and challenges identified by RV.

LO highlighted the importance of improving pulse crop performance because pulses tick all the boxes in terms of achieving low-input, sustainable agriculture and improving human health. Not only do pulse crops release less greenhouse gasses compared to most other food products, they also fix atmospheric nitrogen and sequester carbon, requiring less input. They offer an ideal break crop in arable rotations due to their ability to regenerate nutrient-deficient soils.

LO added that pulse crops are renowned as a source of healthy nutrition with high levels of protein, minerals and vitamins as well as resistant starch that helps to keep blood sugar low. Several studies have shown that missing out on legumes in our diet can have serious consequences for human health and mortality.

As a sustainable source of protein, LO explained that it requires 50-80 times more land to produce 100g of protein from beef and lamb than it does from pulse crops, while they produce up to 100 times less greenhouse gasses per 100 g protein produced.

LO described a number of examples of ongoing activities in the UK to improve the quality and performance of pulse crops.

Firstly, pre-breeding research in Faba bean at NIAB by Tom Wood and Jane Thomas has led to the identification of improved resistance to Chocolate spot in Faba germplasm. Through their genetic studies, such as QTL analyses, they have developed genetic tools for breeders to track resistance in breeding programmes and even generated early-stage material that can be included by breeders in their programmes. This is an excellent model for pre-breeding research.

In a collaborative effort within the Defra-funded Pulse Crop Genetic Improvement Network (PCGIN), Sanu Arora from the John Innes Centre is leading on understanding the genetic basis of resistance to Downy Mildew in pea. 220 lines have been screened for resistance/susceptibility to Downy Mildew and by combining a candidate gene approach based on Sanu's work with NLR resistance genes in wheat and a Genome-wide association study, a single very strong candidate locus was identified. The presence of this gene correlates very strongly although not entirely with resistance, suggesting that Sanu has identified an important genetic component, but that other genes contribute.

LO also highlighted ongoing research efforts to improve yield, including another PCGIN study on pea yield by Chia Hattori and Noel Ellis to identify genes that control seed size and seed weight. This project is carried out in collaboration with PGRO and a number of candidate genes have been identified across the seven pea chromosomes.

LO explained that increased digestibility of seed protein is another important trait. Breaking down the protein into its amino acid components is necessary for the body to reuse these amino acids to build new proteins. Tracy Rayner and Claire Domoney from JIC have developed pea lines

with increased protein digestibility, verified using the Infogest model, which simulates gastro-intestinal food digestion.

Unlike protein, starch provides increased health benefits if it remains undigested. In another study, Claire Domoney and colleagues at Imperial College London and at the Quadram Institute have shown that a pea line with a certain genotype producing wrinkled seeds, results in lower blood sugar and insulaemic response. This has been referred to as a 'Super Pea' in the press with potential for designing health-promoting food with reduced risk of type 2 diabetes.

New technologies such as DNA sequencing are allowing researchers to exploit existing genetic diversity in pulses. Scientists at the John Innes Centre including Noam Chayut and Noel Ellis have collaborated with Shifeng Cheng from the Agricultural Genome Institute of Shenzen (AGIS) in China to genome sequence a panel of >700 pea lines. This resource will be extremely powerful in identifying the genes controlling important traits for pea crop improvement such as plant height, pod shape, seed size, fertility, disease resistance and pod colour. With the necessary investment such resources could also be generated for other pulse crops.

Efforts to identify genes that underlie specific biological processes with relevance for crop improvement will require further underpinning technology already available in other crop systems such as cereals, including high-quality genome sequencing. It will also require efficient transformation capabilities both to verify the function of candidate genes, and to enable induced targeted modification of gene function through gene editing in the development of improved cultivars. LO noted that legumes are notoriously resistant to transformation, but efforts to optimise and further develop protocols in this area are ongoing both at the John Innes Centre by Monika Chhetry and at NIAB led by Emma Wallington.

LO emphasised the need to reduce the use of nitrogen fertiliser to achieve sustainable food production in the agricultural sector, noting that the war in Ukraine, with spiralling fertiliser costs, has reinforced the urgency of this issue. He stressed that pulse crops must take an increasingly prominent role in future cropping systems to reduce dependence on nitrogen fertiliser and to achieve long-term sustainable food production. Increased investment from funding bodies is urgently needed to support and develop a strong legume research and crop improvement base, as an underfunded area globally and in the UK. Such investment will benefit the environment, human health and the UK economy.

Elena Walden, Policy Manager, Good Food Institute (GFI) Europe

Elena Walden (EW) introduced Good Food Institute Europe as an international non-profit organisation focused exclusively on accelerating the trajectory and development of sustainable proteins. GFI aims to this by working with academics and scientists, policymakers, the food industry and investors to identify and overcome where bottlenecks are – whether in terms of research, innovation, investment or regulation - for reaching price and taste parity with conventional animal protein. GFI Europe is 100% funded by philanthropic donors.

EW outlined that the thinking behind sustainable proteins, which comes from a recognition of two parallel starting points:

Firstly, the current system of animal agriculture is a serious threat to the climate emergency, as well as other public health threats such as zoonotic diseases and anti-microbial resistance;

Secondly, an acknowledgement that people really like eating meat. Despite knowing all of the problems with animal agriculture, increasing demand does not show any signs of slowing down globally, and in the UK demand is not slowing down enough to be in line with climate targets.

EW explained that the Good Food Institute takes the approach that education alone will not be enough to meet this challenge, and that it is important to explore innovative ways to provide

people with the meat and dairy products they want to eat, as delicious, affordable and accessible as conventional animal products, but produced in vastly more sustainable ways.

EW indicated that sustainable proteins currently come in three production pillars – plant-based, fermentation-made and cultivated.

She explained that fermentation can be used to create standalone products, and is also increasingly being used to expand plant-based capabilities, providing key functional and sensory boosts. By contrast cultivated meat is genuine animal meat but grown directly from cells rather than by raising animals.

Focusing on plant-based proteins, EW noted that veggie burgers and sausages have been available for decades, but the new generation of plant-based meat is about breaking meat into component parts and looking to recreate and bio-mimic that eating experience with plants. As such it is a surprisingly relatively recent area of food innovation resulting a new range of meat- and fish-like products.

She added that this approach is working in terms of tapping into the meat-eating demographic with early signs of success. For example, 98% of consumers buying Impossible Burger products are also buying animal-based meat, but there is still work to be done to break down the two biggest barriers to greater consumer uptake in Europe: taste and price.

She suggested that the fact taste and price parity has not yet been achieved is not particularly surprising given the level and type of R&D in this space – almost exclusively driven by the private sector. The nature of private sector R&D (more narrow, short-term, commercially-focused) means a number of foundational gaps exist across the whole value chain - from raw material input to processing/texturising.

These R&D gaps include basic under-exploration of the types of plant protein that can be used for plant-based meat; historically and still dominated by wheat and soy because these crops are widely grown. GFI has done some mapping of other potential plant-based protein sources and identified a number of pulses as having high potential, such as faba bean and lupin.

Similarly, plant protein crops have not been optimised for the protein content and functionality required by many plant-based foods. Historically, most crops used as the predominant protein sources for plant-based meat have been optimised for use of their oils and starches, but crop varieties geared toward protein products need to be developed.

Further R&D gaps exist around processing techniques, which are still dominated by the use of wet extrusion processing - again not for best reasons, but because this is what is used in meat processing techniques. EW suggested that other processing and texturisation techniques, such as biospinning, could be better for plant-based meat, but research is needed in this space.

She highlighted a potential leadership role for the UK in this high-growth sector, given its scientific strengths in early-stage plant genetic research, crop breeding and industrial processing. EW noted that DIT had identified the North East of England as a high potential area to develop plant-based meat, but this expertise had not yet been leveraged, with just £550k UKRI funding directed towards academic research to improve the functionality of plant-based meat over the past 15 years.

With plant-based meat projected to make up 6% of the global meat market by 2030, this will require 5-10 times more production capacity than at present and, as an example, a 10-fold increase in the supply of pea protein. EW advised that early action by the UK to earmark R&D funds to develop the functionality of plant-based meat could play a key role in unlocking this growth potential.

Dr Richard Harrison, Director of Cambridge Crop Research, NIAB
Dr Richard Harrison (RH) explained that as Director of Cambridge Crop Research he leads NIAB's research capabilities in arable genetics, pathology, biotechnology, data science and some of the statutory work for Defra.

RH noted that when considering pulse crops' contribution to plant-based protein it is also important to take account of oilseeds, as many oilseeds have proteinaceous by-products. The European market for plant-based protein is dominated by soya imports, with only a small fraction of plant protein needs met by domestic production. Europe imports around 32 million tonnes of soy each year in all its different forms, about 10% of that to the UK. Europe is ~10% self-sufficient in soy production alone and Europe-wide production of all other protein and oil crops is cumulatively less than soy imports.

The importance of self-sufficiency in plant protein has often been highlighted by academic, government and industry sources; but there are several key challenges. Firstly, the most versatile legume, soy, is poorly adapted to most of Europe, but also other globally important protein crops, such as chickpea and lentils, are not widely produced. Secondly, home-grown sources of protein for animal feed, which drives the market, are often not competitive with imported soy. The legumes that we do grow have weaknesses such as poor yield stability, pest and disease susceptibility and a lack of sufficient margins, or in some cases (e.g. lupin) a guaranteed market, which all contribute to an overall lack of adoption and a lack of investment in genetics, when compared to wheat.

However, RH suggested there is an enormous opportunity to improve both existing and novel crops and use our improved regulatory landscape to harness new technologies for rapid improvement of both field and end-use performance of legumes, in particular pulses.

The commercial market for meat alternatives is experiencing enormous growth, which if high performing varieties were available for domestic production could represent a strong commercial opportunity The food ingredient market is expected to grow five-fold in the next few years, whereas the animal feed market is expected to grow by one-third, although the total size of the feed market currently outstrips the food market by several orders of magnitude.

RH noted that in considering the need for viable protein crops for the UK and northern Europe more generally, the whole supply chain must be considered as well as the wider environmental performance characteristics that the crop must deliver. Crops must be bred for efficiency, resilience against abiotic and biotic stresses as well as yield, and traits important for processing, flavour and nutritional composition must be optimised when considering end-use quality of the crop.

RH suggested that a more holistic understanding of both nutritional and anti-nutritional components and their effect on the gut microbiome is going to be crucial in the future to ensure that diets remain healthy and nutritionally complete.

RH highlighted NIAB's connecting role between discovery science and commercial implementation. NIAB has been working for several years on pulse crops such as faba bean, but its research focus is increasingly diversifying into other legume crops, particularly soy, and to build partnerships that will help accelerate the innovation required to address the protein crop challenge.

RH detailed some of NIAB's key strategic partners and programmes in this area. NIAB is working closely with the John Innes Centre to establish research platforms that span multiple pulse crops, building on the work taking place in PC-GIN. NIAB's alliance with the University of Cambridge, the Crop Science Centre led by Prof Giles Oldroyd, has brought in new researchers working on crop nutrition and symbiosis, new breeding technologies, photosynthesis and pest

and disease research, boosting UK research activity in this area. The UKRI-funded £18m investment in Strength in Places, Growing Kent and Medway, led by NIAB from its East Malling site, also has the wider alternative proteins sector as a key pillar towards end-to-end capability, including a food processing laboratory at the University of Greenwich which will allow the evaluation of processing and nutritional traits. Finally, the BBSRC-funded Collaborative Training Partnership in Sustainable Agricultural Innovation, led by industry and co-developed with NIAB and the Crop Science Centre, aims to train 30 PhD Students. Unusually, it has placed equal priority on protein crops and cereal crops. PGRO is a key partner, along with retailers and large breeding and agchem companies.

However, RH emphasised that these promising initiatives and partnerships all require additional investment, both public and private, if they are to deliver the promise of improved crops.

RH underlined the phenomenal opportunity to harness the skills within UK institutes and universities to accelerate the development of this market through genetic innovation.

In developing a 21st century pre-breeding programme for pulses, RH highlighted five inter-connected activities that together can be harnessed to deliver much more rapid breeding improvements than ever seen before.

The use of genomic prediction, which allows estimates of plant performance prior to planning, is already improving the selection of new varieties, and complements other new approaches in plant breeding. Integrating genomic selection with crop modelling means researchers can rapidly spin the wheels of breeding improvement faster and more accurately than ever before. This is only affordable now due to the step change in DNA sequencing technology.

RH explained that the genomics capabilities at JIC and NIAB have been developed over many years, and work in the Designing Future Wheat collaboration has shown how genomic selection can be used by breeders to harness new genetic variation arising from pre-breeding programmes.

Speed breeding to cycle through generations in the glasshouse rather than the field is another key technology in accelerating the rate of genetic improvement, and both The Crop Science Centre and The John Innes Centre have state-of-the-art speed breeding capabilities and are jointly working up protocols for speed breeding in faba, soy and other pulse crops.

RH added that multi-environment trialling, harnessing genomic data and high throughput in-field phenotyping is also crucial to successful genomic prediction. NIAB has one of the largest field trial networks in the country, which to date has not been extensively used for genomic-assisted breeding. RH noted that Prof Ji Zhou, who leads NIAB's data sciences department, has developed some amazing capabilities to measure plant traits automatically in the field, integrating sensor devices, satellite, drone and smartphone data to provide estimates of plant performance throughout the whole growing season.

RH explained that the use of crop modelling to rapidly identify traits for selection and to simulate breeding programmes computationally is a rapidly developing area for NIAB. It involves using a particular kind of crop model that accurately represents the architecture of the plant, allowing realistic simulations of growth in fluctuating environments to be carried out. Coupling crop models to machine learning methods allows the rational design of crop ideotypes and architectures that perform in different farming systems.

RH noted that transformation (GM) and gene editing technologies are integral to any modern breeding programme. NIAB has been working for many years to improve crop transformation methods in legumes and recently transformed soybean for the first time.

In addition, the use of machine learning to provide new breeding targets for technologies such as gene editing is now a real possibility. Building on the last thirty years of discovery science we can use our knowledge of biological function of genes to provide new genetic variation which would likely be at very low frequency in natural populations to further enhance genetic gain per unit of time. This is an area of active research at NIAB.

RH closed by indicating that combining these complementary pre-breeding approaches to deliver genetic improvement in pulses and legumes could potentially shorten a 30-year research programme to 7-10 years.

3. Questions & discussion

The following key points arose during discussion:

(i) The importance of nematode resistance as a key research challenge to make home-grown pulses a more viable prospect for growers, again highlighting the 'chicken and egg' situation of market failure, not only in breeding and genetic improvement but also in agronomy and crop protection, which underlines the need for Government intervention and targeted public investment;

(ii) Although public sector funding is available for research and innovation, it is not pitched directly at pulses but at general crop-related projects to be reviewed on a competitive basis. Pulse-related proposals are rarely successful. If Government really does want to see an increase in home-grown pulses then it must generate a dedicated R&D fund to support that objective, and such funding needs to support end-to-end activities from trait discovery and pre-breeding through to agronomy and knowledge transfer, market data and the development of a functional supply chain including acceleration of end-product innovation. The nascent mechanisms to do this exist within both UKRI (eg Designing Future Wheat Inter-Institute Programme) and through the Defra Farming Innovation Pathways competition, but it will need joined up thinking and cross-sectoral collaboration to deliver;

(iii) International models which have been shown to deliver progress in this area include in Canada, where a Government-backed super-cluster works directly with growers to identify, develop and supply new consumer markets; Singapore also encourages a collaborative, end-to-end approach to supporting agri-food innovation;

(iv) In view of recent research findings in relation to suppressive soils and their role in reducing the impact of crop disease, whether breeding objectives should target particular production systems or objectives – eg regenerative soils or microbial function - rather than specific disease resistances or agronomic traits.

(v) In view of the challenge of agchem availability for pulse growers (eg no seed treatments available for pulses), whether Government should also be looking to invest in the development, assessment and fast-track or light-touch regulation of alternative biocontrol agents and strategies – a potential growth area for innovative SMEs with international market opportunities;

(vi) The need to ensure the conversation regarding the development of home-grown pulses includes livestock farmers and the animal feed sector.

Concluding the session, the chair thanked guest speakers, members and stakeholders for their contribution to a stimulating and highly informative session.