

**Final Version**

# **National Pulse Research Strategy 2026-2031**

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## **Pulse Canada**

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# I. Purpose and Vision of the National Pulse Research Strategy

## a. Purpose

The goal of this National Pulse Research Strategy is to help coordinate research investments that support the long-term profitability, competitiveness, and sustainability of Canada's pulse sector. This strategy identifies national research priorities intended to strengthen pulse production, quality, market opportunities, and value creation for Canadian growers and the broader industry.

## b. Our Vision

- Pulses are a profitable choice for Canadian farms, human health, animal nutrition, and environmental sustainability.
- Canadian pulses are the preferred choice for customers around the world.
- Canada is recognized for collaborative, nationally coordinated pulse research that catalyzes innovation across the pulse sector

The following pages describe the four **strategic outcomes** that are the basis of this strategy. For each outcome, we list the **key drivers** that we anticipate will be crucial in leading the progress towards the strategic outcomes. Following that section, the high-level **research priorities** are listed for each of the four strategic outcomes. The final section describes **enabling activities** that will accelerate research progress and the uptake of innovation along the value chain.

## 2. Strategic Outcomes

The following strategic outcomes represent interconnected priorities that collectively support the long-term profitability, competitiveness, and sustainability of Canada's pulse sector. Together, these outcomes reflect the importance of maintaining strong production systems while continuing to strengthen quality, reliability, market opportunities and end-use value across domestic and international markets.

- **Pulses are a profitable component of diverse crop rotations that enhance farm sustainability.**
  - Innovation drives step-change in yield gains & productivity
    - Yield, quality, sustainable production practices and costs of production contribute to profitable margins for growers
    - New technologies and traits positively impact profitability through mitigation of risks and providing solutions for growers that are sustainable and reduce reliance on pesticides.
    - Pulses are profitable on their own and increase profitability of the rotation.

- Pulse crop production is recognized as a key opportunity to meet Canada's environmental sustainability goals
  - Pulses add to the sustainability of crop rotations through reducing carbon footprints, lowering GHG and increasing water use efficiency
  - Pulses add value to crop rotations through positive influence on following crops.
- **Growers produce a safe, reliable and consistent supply of Canadian pulses to meet growing demand.**
  - Stable and consistent yields of pulse crops adapted to biotic and abiotic stresses
    - Root disease has minimal impact on realized yields and on yield stability
    - Integrated Pest Management practices and biotic stress resilience mitigate the risks of weeds, diseases and insects
    - Climate change adaptation and abiotic stress resilience support yield stability along with the expansion of pulse crop areas and crop options and understand susceptibilities in the face of climate change
    - Canadian growers have reliable access to high quality seed supply of adapted varieties.
  - Innovative products and sustainable management practices ensure a consistent and safe supply of pulses
  - Pest management options are safe and effective and include alternatives such as biologicals, variety resistance and new advancements
  - Continuous improvement in management practices and variety development enhances the harvestability of pulse crops.
- **Canadian pulses consistently deliver the quality required to meet market specifications and maximize value across end uses.**
  - Quality is defined by end-use performance requirements across food, feed, and pet food markets, ensuring Canadian pulses are fit-for-purpose and provide customer confidence
    - Desired quality attributes (e.g. composition, flavour, functionality, safety, sustainability, colour) for pulses are clearly defined, along with standardized analysis methods that support regulatory and customer specifications compliance
    - Variability is characterized and managed to improve consistency, interchangeability, and reliable performance across suppliers, crop years, and production regions
    - Quality programs are established in Canada for pulses and translated as accessible data to support informed decision-making practice by growers and industry
    - Varieties are developed that deliver targeted quality characteristics aligned with market needs
    - Research strengthens understanding of flavour, nutritional, quality, and processing impacts on end-use performance
    - Growers receive value for the products produced.
- **Canadian pulses are readily adopted across food, feed and pet food applications supporting diversified market opportunities, strong demand, and commercial value.**
  - Pulse ingredients deliver reliable performance with demonstrated value in real-world applications

- Performance is validated in food, feed, and pet food systems, with benchmarking against competing ingredients
- Formulation and processing solutions improve the integration of pulses into products by addressing challenges related to flavour, texture, nutrition, stability, and cost
- Consistent and predictable performance supports confidence in use, substitution, and scale-up
- Predictive tools and data link quality to application performance and product outcomes
- Innovation expands pulses into new and higher-value applications, while supporting both volume-driven and value-driven markets
- Research generates credible evidence to support nutritional, functional, sustainability, and economic value propositions of pulse ingredients across target market

## 3. Research Priorities

### 1. Pulses are a profitable component of diverse crop rotations that enhance farm sustainability

#### Key drivers

- Innovation drives step-change in yield & productivity
- Pulse crop production is recognized as a key opportunity to meet Canada's environmental sustainability goals

#### Research priorities

- Increase yield potential, expression and profitability through variety development and the adoption of breeding innovations, with particular focus on high yielding varieties with appropriate crop quality and development of traits that reduce cost of production (e.g., nitrogen fixation, pest resistance) while supporting the quality and reliability needed across domestic and export markets (e.g. protein)
- Expand the adaptability of pulse crops to ensure there are sustainable pulse crop options for every hectare of crop production. Specific targets for increasing adaptability and resilience to climate change include:
  - Yield stability under variable climatic conditions (e.g., understanding variety-specific genetics by environment and by management (G x E x M) impacts) for all pulses
  - Drought tolerance in peas, dry beans and chickpeas
  - Excess moisture stress resilience in peas, lentils, and dry beans on rainfed eastern prairies, without yield penalty in the absence of stress
  - Faba bean adaptation to rain-fed areas, heat tolerance, early maturity and post-harvest quality (e.g., staining damage, seed coat integrity, protein content)
  - Cold tolerance and early maturity in dry beans
- Investigate new crop opportunities to increase the options for pulse crops in diverse and sustainable rotations
  - Conduct feasibility assessments of alternative pulses to determine new pulse crop options in Canada's changing climate, including crop adaptability and marketability
- Quantify and increase the sustainability profile of pulse crops, including:

- Develop and evaluate novel technologies to increase the sustainability of pulse crops (e.g., improved nitrogen fixation technologies, optimize fertility management, incorporate no-till practices, cover crop options)
- Quantify the value of pulse crops in rotation, including beneficial impacts on following crops in the rotation
- Demonstrate and update the sustainability profile for pulse crops
- Establish the role of pulses in reducing GHG emissions across crop rotations, particularly with regards to fertilizer use patterns
- Quantify the potential yields, actual yields, and yield gaps for Canadian pulses as well as identify the environmental and/or management factors contributing to yield gaps. Use this G x E x M information to establish agronomic management practices to close the gaps, as well as to target traits of interest for genetic improvement

Develop genomics and phenomics tools to assist germplasm enhancement for increasing rates of gains and development of new traits in varieties through increased efficiencies.

## **2. Growers produce a safe and reliable supply of Canadian pulses to meet growing demand**

### **Key drivers**

- Stable and consistent yields of pulse crops adapted to biotic and abiotic stresses
- Innovative products and sustainable management practices ensure a safe supply of pulses

### **Research priorities**

- Prevent and/or mitigate damage from root rot diseases through a national, coordinated and focused approach. Specific priorities include:
  - Genetic resistance to root rot complexes with tools available to support germplasm development and evaluations
    - For peas and lentils: *Aphanomyces*, *Fusarium* sp.
    - For dry beans: *Fusarium* sp., *Pythium*, *Rhizoctonia*, *Chalara*
    - For faba beans and chickpeas: identify root rot pathogens of concern
  - Development of diagnostic and prediction tools for root rot infection in peas and lentils, with priority on *Aphanomyces* and *Fusarium*
  - Development of new technologies to mitigate yield losses caused by root rots (e.g., new chemical or biological control products, land management strategies that reduce oospore loads, agronomic practices and rotations that mitigate disease pressure)
  - Better understanding of the populations and biology of root rot pathogens/organisms in order to develop integrated management plans and control options
- Develop genetic resistance, herbicide tolerance, and/or Integrated Pest Management (IPM) strategies for control of priority diseases, weeds and insects, listed in Appendix A
- Improve the harvestability of pulse crops, specifically:
  - New management strategies and technologies to reduce reliance on preharvest products, including improved genetics for early and uniform maturity as well as more determinant varieties.
  - Improve standability and reduce lodging in peas and faba beans
  - Improve canopy and root architecture, increase pod height in dry bean

- Improve canopy architecture and agronomic performance of large seeded pulse crops (e.g. chickpeas, kidney beans)
- Advance the security of a domestic seed supply through resistance and/or management strategies to control seed-borne disease, including common bacterial blight and anthracnose (with a focus on dry bean seed production) and PSbMv in peas
- Take a proactive approach to pest management through developing models for prediction, national coordinated monitoring systems, and investigation of potential new threats (new insects, viruses and weeds)
- Identify alternative control options for pests that reduce reliance on pesticides and/or develop pesticides/pest control products that minimize non-target effects and are environmentally safe
- Develop management strategies for pulse health to enhance ability to withstand abiotic and biotic stress
  - Macro- and micro-nutrient impacts on plant health and ability to withstand stress
  - Pulse nutrient management, with particular interest in P management, and N management for new areas of adaptability

### **3. Canadian pulses consistently deliver the quality required to meet market specifications and maximize value across end uses.**

#### **Key drivers :**

- Canadian pulses meet performance expectations of global food, feed, and pet food markets
- Quality, consistency, and reliability are critical to support the competitiveness of Canadian pulses relative to their alternatives in global markets
- End-use requirements define quality needs across diverse applications, ensuring pulses are suited to their intended use
- Standardized, transparent, and fit-for-purpose quality systems strengthen customer confidence and support valorization across the value chain

#### **Research priorities**

- Define end-use aligned quality attributes
  - Identify and standardize quality traits required for specific markets and applications (food, feed, pet food)
  - Align breeding, production, and processing targets with customer and market requirements
- Improve consistency, predictability, and reliability of pulse quality traits.
  - Understand sources of variability including genotype × environment × management × storage × processing
  - Establish acceptable ranges for key quality traits to improve interchangeability and reliability
  - Enhance consistency across suppliers and production regions
- Advance understanding of flavour and sensory drivers
  - Identify compounds and mechanisms responsible for off-notes and undesirable flavours
  - Assess the impact of genetics, environment, processing, formulation, and storage on flavour profiles
  - Generate foundational knowledge and practical mitigation strategies to improve flavour and sensory performance

- Strengthen nutritional quality and bioavailability
  - Characterize amino acid composition and bioavailability
  - Improve understanding of digestibility and nutrient utilization across applications
  - Assess variability in nutritional quality and its drivers
- Address anti-nutritional factors and safety
  - Identify and quantify anti-nutritional components (e.g., phytates, tannins, enzyme inhibitors, vicine and convicine)
  - Monitor and manage contaminants (e.g., heavy metals, mycotoxins) to maintain market access
  - Ensure alignment with evolving regulatory and customer requirements
- Understand the impact of processing on end-use quality
  - Evaluate how raw material differences and processing methods influence functional, nutritional, and sensory properties
  - Link seed characteristics and processing conditions to changes in protein structure, starch behavior, flavour development, and application potential
- Develop coordinated analytical systems and methods
  - Establish standardized, application-relevant analytical methods and testing protocols
  - Build accessible data systems to support transparency, benchmarking, and informed decision-making
  - Enable integration of quality assessment across the value chain

#### **4. Canadian pulses are readily adopted across food, feed and pet food applications supporting diversified market opportunities, strong demand, and commercial value**

##### **Key drivers**

- Adoption is driven by demonstrated value and performance in real-world applications
- Reducing technical and practical barriers is critical to scaling use across markets
- End users require predictable, reliable, and easy-to-use ingredients
- Market success depends on linking pulse quality to performance, cost, and use cases in application
- Growth opportunities are supported by alignment with priority markets, categories, and regional demand trends

##### **Research priorities**

- Demonstrate application performance and value
  - Validate ingredient performance in real-world applications across food, feed, and pet food
  - Benchmark pulses against competing ingredients across technical performance, economics, processing compatibility, sensory outcomes, and sustainability metrics
  - Build evidence linking ingredient attributes to functional, nutritional, economic, and sustainability benefits
- Develop formulation and processing solutions
  - Create practical strategies to optimize use and enhance performance in different applications
  - Address key challenges such as flavour, texture, stability, and processing constraints

- Advance blending approaches and multi-ingredient systems to improve functionality and formulation performance
- Improve sensory performance and flavour outcomes
  - Develop approaches to manage off-notes and enhance sensory appeal (e.g. flavour modulation, pairing, processing interventions)
  - Support development of products that meet consumer expectations across categories
- Enable consistency and reliability in application
  - Define performance ranges and tolerances in formulations
  - Support consistent product outcomes despite variability in raw materials
  - Enable confident substitution, scaling, and supply flexibility through improved predictability, interchangeability, and specification consistency
- Develop predictive tools and decision-support systems
  - Link composition and quality attributes (Outcome 3) to application performance
  - Provide tools to support formulation, ingredient selection, product optimization, and troubleshooting
  - Improve predictability of outcomes across different use cases
- Advance new uses and higher-value applications
  - Identify and validate opportunities for pulses in new and emerging product categories
  - Expand into higher-value applications through innovation in processing, formulation, and functionality
  - Support both large scale volume markets and differentiated higher-value applications that improve long-term competitiveness and value capture
- Address targeted technical gaps by sector
  - Food: functionality, flavour, processing, and sensory performance
  - Pet food: amino acid balance, digestibility, palatability
  - Feed: species-specific performance and efficiency
- Support regulatory alignment and market claims
  - Generate evidence to support claims related to nutrition, functionality, and sustainability
  - Address regulatory requirements and compliance across markets
  - Enable clear, credible communication of value to end users

## 4. Enabling Activities

In addition to the research priorities, four topic areas have been identified as critical areas to accelerate research progress. These are intended to be new and specific actions that the sector will take during the course of this strategy. These actions are designed to achieve the following:

- Place Canada's pulse industry at the forefront of pulse innovation
- Enhance the efficiency of Canada's pulse research programs
- Capture maximum value from pulse research investment

### I. Embrace New Technology & Innovation

To remain competitive in global markets, the pulse sector must accelerate the adoption and application of new technologies that drive improvements across the value chain. This includes not only advancements in genetics and agronomy, but also technologies that enhance processing, functionality, and end-use performance. Leveraging emerging tools such as genomics and artificial intelligence will support more efficient decision-making, improve productivity and sustainability, and enable the development of pulse crops and ingredients that meet evolving market needs.

#### Enabling Actions:

- Explore breeding tools and new technologies to identify those that are best positioned to drive advancements in yield gains, including genomics, phenomics and other novel approaches.
- Enable and encourage development of alternative pest management products (i.e., RNAi, biologicals, etc.).
- Strengthen weed science research capacity to develop solutions for pulse crop weed control and harvest management.
- Develop point-of-need pest diagnostic tools to enable timely decision-making.
- Develop national monitoring and surveying program for insects, disease, and weeds
- Leverage digital technologies, data systems, and artificial intelligence to improve decision-making, predictive capabilities, and the management of complex production and processing challenges
- Explore innovations from adjacent sectors (e.g., digital technologies, artificial intelligence, forestry, and landscape management) to identify novel approaches applicable to pulse production and management
- Apply analytical, processing, and modelling technologies to better understand and improve processing performance, ingredient functionality, and end-use application outcomes

### II. Attract New Investment

To realize the full potential of pulses and adapt to evolving market and funding environments, the sector needs to attract new sources of research investment and develop funding models that better align with commercial opportunities and market demand. Strengthening investment strategies will help ensure that research is not only innovative, but also relevant, scalable, and capable of supporting adoption across food, feed, and pet food sectors. A more coordinated and market-oriented approach to investment will enable the sector to capture greater value and accelerate impact.

## Enabling Actions:

- Develop an environment that encourages and attracts new research investment, including piloting new models for pulse variety commercialization
- Explore public-private partnerships to gain faster access to new technologies and accelerate innovation.
- Enable technology transfer, on farm/pilot validation, and commercialization pathways to support entrepreneurship and the translation of research into commercially viable solutions and faster adoption across the value chain
- Develop partnerships to increase diagnostic capacity for pulse pests and quality traits
- Foster a regulatory and policy environment that attracts new investment (e.g., predictable and effective regulatory approval pathways, value capture for new technologies, protection of existing tools)
- Support and foster a regulatory and policy environment that recognizes the unique contribution of pulse crops to Canada's sustainability targets
- Coordinate and leverage research with new research funding partners, based on the potential for pulses to contribute to Canada's environmental and economic goals (e.g., Environment and Climate Change Canada (ECCC), Innovation, Science and Economic Development Canada (ISED), Protein Industries Canada (PIC), Genome Canada, the Natural Sciences and Engineering Research Council of Canada (NSERC), and provincial funding sources such as Alberta Grains' Agriculture Funding Consortium (AFC) and Saskatchewan Agriculture Development Fund (ADF)).
- Leverage consumer trends and the value proposition of pulses to align with the business objectives of industry to facilitate funding partnerships
- Align research investment with clear commercial opportunities, industry demand, scalability, manufacturability, and likelihood of adoption to ensure projects support market uptake across food, feed, and pet food sectors
- Engage industry partners across food, feed, and pet food value chains to co-invest in research that addresses real-world formulation, processing, and application challenges
- Support research, innovation, and commercialization pathways that maximize long-term value creation, competitiveness, and benefit for the Canadian pulse sector
- Integrate economic feasibility and competitiveness considerations into research investment decisions to ensure that innovations are viable and scalable in commercial markets

## III. Enhance Research Coordination

Coordination empowers the Canadian pulse community to advance its goals. Strengthening coordination across the research ecosystem will enable greater alignment of priorities, more efficient use of resources, and improved outcomes across the value chain.

Provincial organizations have a leadership role in funding and delivering the research activities required to support their growers, which includes developing research activities and communicating results. Provinces are expected to take the strongest leadership role on Outcomes 1 and 2 of the strategy. Pulse Canada, in collaboration with partners, is expected to take a higher level of leadership on Outcomes 3 and 4, particularly in areas related to quality, processing, and end-use adoption. For all outcomes,

engagement across the commercial pulse value chain is critical to maximize the value, relevance, and impact of research efforts supporting the sector.

In many cases, disease pressures and crop priorities are regionally specific. However, some challenges extend across provincial boundaries and require additional coordination. In these instances, greater alignment of research efforts can significantly enhance impact. Priority challenges such as root rot represent an opportunity to strengthen coordination through a more unified, national approach.

All parties highlighted the need to advance innovation in pulse research by expanding the number and diversity of researchers engaged in these issues, as well as strengthening collaboration across organizations and disciplines. There is also a clear opportunity to engage new sectors and global expertise to bring forward innovative approaches and solutions that can be adapted to the Canadian context.

Root rot has also been consistently identified across regions as a major constraint to pulse production, impacting yield stability, crop reliability, and long-term sustainability of pulse rotations. Its complexity, driven by multiple pathogens and strong environmental interactions, requires a coordinated, national research approach.

### **Enabling Actions:**

- Strengthen cross-provincial coordination and alignment of research priorities to maximize efficiency, increase capacity, and optimize the impact of research investments.
- Clarify and leverage complementary roles across the research ecosystem, recognizing provincial leadership in production-focused research and national leadership in quality, processing, and market-driven research, while strengthening the active participation of growers, industry partners, and end users in shaping and contributing to research efforts across the value chain.
- Advance multi-disciplinary and cross-sector collaboration, bringing together expertise from agronomy, breeding, pathology, entomology, weed science, soil science, food science, flavour & sensory science, nutrition, microbiology and fermentation, animal science, processing and chemical engineering, data and digital technologies, economics, sustainability, regulatory science, and other relevant fields to address complex challenges.
- Expand engagement with new researchers, disciplines, and global partners, including exploring innovations from other sectors such as artificial intelligence, digital systems, engineering, forestry, landscape management that may offer novel solutions to agricultural and utilization challenges (e.g. flavour)
- Strengthen coordination on nationally significant challenges, such as flavour and root rot, including through collaboration with existing coordination initiatives (such as the root rot taskforce), to ensure consistent methodologies, comparable data, and aligned research efforts across regions
- Enhance collaboration across research organizations (federal, academic, and private) to increase capacity and enable more integrated and impactful research approaches
- Increase investment in field-scale, on-farm research and pilot-scale research, building on successful provincial initiatives to generate practical, scalable solutions and improve the translation of research into actionable recommendations for growers and assist with adoption on-farm

- Improve data integration, analysis, and knowledge sharing across projects, enabling more effective use of research outputs and supporting evidence-based decision-making

#### IV. Strengthen Communication

Effective communication across the pulse value chain is essential to ensure that research is relevant, aligned with market needs, and translated into real-world impact. Strengthening communication networks will improve coordination between researchers, growers, industry, and end users, enhance the responsiveness of the research system, and increase the efficiency and value of research investments. This includes enabling stronger two-way communication, where growers, market and end-user insights inform research priorities, and research outcomes are translated into practical, application-oriented knowledge that supports adoption across the value chain.

##### Enabling Actions:

- Foster stronger relationships between researchers, industry, agronomists, growers, funders and end users. The pulse sector relies on researchers and the expectations between these groups need to be affirmed. Such as:
  - Establish a consistent communication path to transfer customer/end-user experiences back to researchers, ensuring alignment with market needs
  - Establish stronger two-way communication pathways between growers, agronomists, and researchers to ensure research priorities, project design, and extension activities remain grounded in practical on-farm challenges, regional realities, and grower adoption needs.
  - Host networking events to foster communication between all stakeholder groups.
- Coordinate extension efforts across regions to deliver consistent messaging for crop beneficial management practices and outcomes of research projects to growers and agronomists, supported by accessible and up-to-date resources
- Establish knowledge transfer (KT) pathways to communicate new information to growers and end-users, including equipping agronomists with the knowledge and training to successfully implement new or alternative practices or varieties on the farm
- More frequent connection and collaboration with pulse research groups/organizations to access global technologies for the improvement of pulse crops through international conferences and meetings.
- Strengthen communication, knowledge transfer, and the dissemination of research outcomes across the full value chain, including growers, processors, manufacturers, and end users, to support the development, evaluation, adoption, and practical application of pulse crops and ingredients in real-world systems and markets.
- Support the development and dissemination of practical tools, standards, benchmarks, formulation guidance, and technical resources that enable consistent evaluation and application of pulse ingredients across different markets and use cases.

## APPENDIX A: Pest & Disease Priorities

This table lists priority pests, with the leading priorities in bold, for the development of genetic resistance and/or pest management strategies.

## Lentils

Insects	<b>Aphids</b> , grasshoppers, wireworm/cutworm, lygus
Disease	<b>Aphanomyces &amp; Fusarium root rots, Anthracnose (fungicide resistant), Stemphylium, Botrytis, Sclerotinia, Ascochyta</b>
Weeds	<b>Kochia, Group 2 resistant weeds</b> , wild mustard, volunteer canola, narrow leaved hawks beard, sow thistle, cleavers, wild mustard, lamb's-quarters, Group 1 and 2 resistant wild oats

## Field Peas

Insects	<b>Pea aphid</b> , cutworm, wireworm, <b>pea leaf weevil</b> (hot spots), grasshoppers
Disease	<b>Aphanomyces &amp; Fusarium root rots, Ascochyta</b> complex (foot rot), <i>Mycosphaerella</i> blight, bacterial blight, pea seed-borne mosaic virus
Weeds	<b>Group 2 resistant weeds, cleavers, kochia</b> , narrow leaf hawks beard, white cockle, volunteer. canola, tall waterhemp, Canada thistle

## Dry Bean

Insects	<b>Western bean cutworm, seed corn maggot</b> , potato leaf hopper, green clover worm, cutworm, wireworm, aphids (as vectors), Lygus, spider mites; Storage pests (bruchids and bean weevils)
Disease	<b>Bacterial blight</b> , <i>Fusarium</i> root rot, <i>Sclerotinia</i> , soybean cyst nematode, white mold; <i>Anthracnose</i> ; Common Bacterial Blight; Bean Common Mosaic Virus; Bacterial brown spot; Rusts; Green Patch
Weeds	<b>Kochia</b> , Canada fleabane, waterhemp, hairy nightshade, with emphasis on <b>Group 2 resistant broadleaf weeds</b>

## Chickpeas

Insects	<b>Grasshoppers, wireworm</b>
Disease	<b>Ascochyta</b> , root rot complexes, rusts, nematodes
Weeds	<b>Kochia</b> , volunteer canola, wild oats, with emphasis on Group 1 and 2 resistant weeds

## Faba Bean

Insects	<b>Aphids, lygus bug, pea leaf weevil</b> , blister beetle, bertha army worm
Disease	<b>Chocolate spot (<i>Botrytis sp.</i>), Stemphylium, Alternaria</b> , root rots and vascular wilts, rusts
Weeds	<b>Cleavers, volunteer canola, Canada thistle</b> , with emphasis on <b>Group 2 resistant weeds</b>

## APPENDIX B: Overview of relevant pulse market classes, formats, end-use categories, and regions based on Pulse Canada's market diversification strategy

Appendix B provides a high-level overview of pulse market classes, ingredient formats, end-use categories, and regions currently considered strategically relevant within Pulse Canada's market diversification activities. The appendix highlights areas where meaningful opportunities for pulse utilization exist across food, feed, pet food, and ingredient applications, recognizing that opportunities vary by region, market segment, ingredient format, and end use. The appendix is also intended to help support alignment between research priorities and commercial opportunities by providing directional guidance to researchers, industry, and other stakeholders across the value chain. Pulse Canada would strongly encourage international collaboration with research institutions and industry partners located within target markets where projects are evaluating relevant crop types, ingredient formats, or end-use applications aligned with Pulse Canada's market diversification strategy.

Current opportunities span a range of domestic and export markets across food, feed, pet food, and ingredient applications, with particularly strong opportunities identified in North America, Europe, and Asia depending on the pulse crop, ingredient format, and end-use category. Opportunities include both established markets and emerging applications where increased pulse utilization may support future sector growth and diversification. Additional opportunities may also exist across Latin America, particularly in feed applications where large-scale demand and established trade relationships may support increased utilization of Canadian pulses and pulse ingredients. Mexico may also represent growing opportunities in food applications through integrated North American supply chains, regional proximity, and evolving consumer demand. Similarly, India represents a strategically important long-term market due to the scale of the population, the significant role of pulses within the diet, and ongoing nutritional needs, including opportunities that may extend beyond packaged food applications alone.

Several ingredient categories and applications may also warrant additional research attention due to their potential relevance across emerging or underexplored markets. Examples include lentil flour applications in food systems, broader utilization opportunities for Canadian LVC faba bean varieties and ingredients, and improved utilization of processing side streams and by-products. While not currently a primary focus of Pulse Canada's market diversification strategy, opportunities that support additional value creation in non-food and industrial applications may also provide benefit to the broader pulse sector where sufficient market value and scalable demand can be demonstrated.

25% of Canada's lentil crop is consumed in food and pet food				
Class	Format	End-Use Category	Target Markets <sup>1</sup>	Notes
Red	Whole	Foodservice	USA, EU/UK	
Red	<b>Flour</b>	Retail Food	NA, EU/UK	
All	All	Pet Food	NA	

50% of Canada's pea crop is destined for value-added processing, pet food, and feed.

Class	Format	End-Use Category	Target Markets <sup>1</sup>	Notes
Yellow	Whole	Feed	NA, LATAM, SE ASIA	NA target sustainability/carbon reductions
Yellow	Fractions	Feed	NA	Species specific
Yellow	Fractions	Aquaculture	NA	
Yellow	Ingredients	Retail Food	NA, ASIA	
All	All	Pet Food	NA, ASIA	
<b>12% of Canada's bean crop is consumed domestically in food</b>				
Class	Format	End-Use Category	Target Markets <sup>1</sup>	Notes
All	Whole	Retail Food	CAD	
All	Whole	Foodservice	CAD	
<b>25% of Canada's chickpea crop is consumed in food and pet food</b>				
Class	Format	End-Use Category	Target Markets <sup>1</sup>	Notes
Kabuli	Whole/Flour	Retail Food	NA <sup>2</sup>	Small caliber seeds
All	All	Pet Food	NA <sup>2</sup>	Small caliber seeds
<b>75% of Canada's faba bean crop is destined for value-added processing, pet food, and feed</b>				
Class	Format	End-Use Category	Target Markets <sup>1</sup>	Notes
LVC <sup>3</sup>	Whole/Fractions	Feed	CAD, USA	Have regulatory gaps
LVC <sup>3</sup>	Fractions*	Aquaculture	CAD	*Protein concentrate
LVC <sup>3</sup>	All	Pet Food	NA	Have regulatory gaps
LVC <sup>3</sup>	Ingredients	Retail Food	NA	

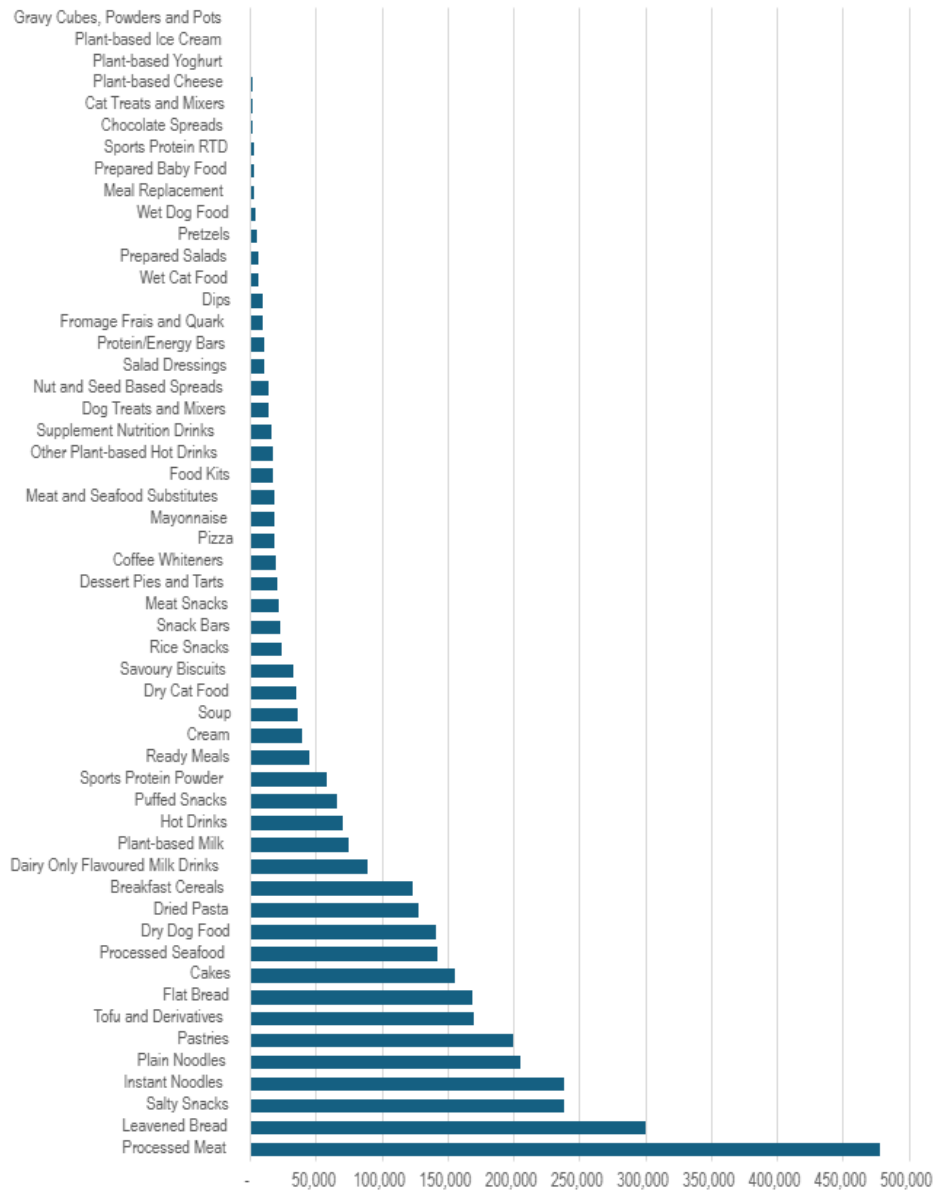
<sup>1</sup> ASIA = Specifically, SE Asia (Singapore, Thailand), NE Asia (South Korea, Japan, China), India; CAD = Canada; EU/UK= Europe (Netherlands & Germany), United Kingdom; NA = North America (United States, Canada, Mexico); LATAM = Latin America (Colombia, Ecuador, Chile, Peru); USA = United States

<sup>2</sup>While NA is the current focus, opportunities in other regions may also be relevant for small-seeded chickpea varieties in food and pet food applications; these markets have not yet been fully defined

<sup>3</sup>Low vicine/convicine varieties

# APPENDIX C: Estimated pulse ingredient potential in human and pet food categories for ten target markets converted to whole pulse equivalents (tonnes)

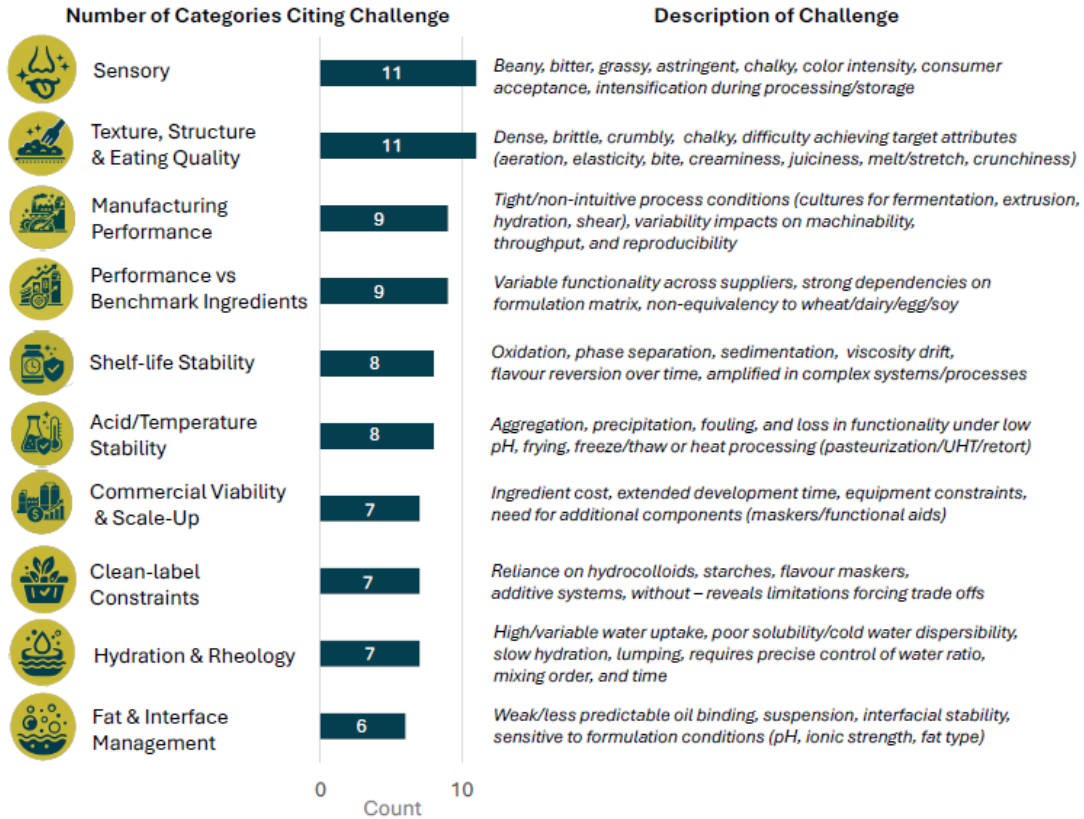
Select Countries Included: Canada, USA, Mexico, UK, Netherlands, Germany, Japan, S Korea, India China



# APPENDIX D: Challenges across food product categories

Technical challenges raise by food manufacturers associated with the use of pulse ingredients

Bakery & baking mixes	●	●	●	●	●	●	●		●	
Bars & granola	●	●					●			
Cheese analogs	●	●	●	●	●	●	●	●	●	●
Egg substitutes	●	●		●	●		●		●	●
Extruded snacks	●	●	●	●	●	●	●	●	●	
Frozen dough	●	●	●	●	●		●	●	●	
Functional beverages	●	●		●	●	●	●			
Plant-based meat	●	●	●	●				●	●	
Processed meat		●		●	●					
Milk & creamer substitutes	●	●	●	●	●	●	●	●	●	●
Sauces & spreads	●			●	●	●		●	●	●
Yogurt analogs	●	●	●	●	●		●	●	●	●



## APPENDIX E: National Pulse Research Strategy Committee (NPRSC) Members

The following NPRSC members participated in the development of this strategy:

Full Name	Title	Organization
Janelle Carlin	Director, Quality, Science & Food Innovation	Pulse Canada
Julianne Curran	Vice President, Market Innovation	Pulse Canada
Denis Tremorin	Director, Sustainability	Pulse Canada
Tanya Der	Director, Diversification & Market Insights	Pulse Canada
Alex Rankovic	Research Consultant	Pulse Canada
Heather Carriere	Director, Program Management	Pulse Canada
Jenn Walker	Research and Extension Manager	Alberta Pulse Growers
Daryl Domitruk	Former Executive Director	Manitoba Pulse & Soybean Growers
Patti Rothenburger	Executive Director	Manitoba Pulse & Soybean Growers
Mike Donnelly-Vanderloo	Chair	Ontario Bean Growers
Olivia Yemam	Project Manager	Ontario Bean Growers
Amber Johnson	Director of Marketing & Communications	Saskatchewan Pulse Growers
Sherrilyn Phelps	Director of Research & Development Office	Saskatchewan Pulse Growers

Pulse Canada and the National Pulse Research Strategy Committee acknowledge the contributions of the many individuals and organizations who participated in the development of this strategy through interviews, workshops, written feedback, and review processes.

The strategy was further informed by consultations with more than 50 ingredient processors, food manufacturers, and other value chain stakeholders across the food, feed, and pet food sectors. These consultations provided valuable insights into pre-competitive research priorities, market opportunities, technical challenges, and research needs, helping to strengthen the strategy's focus on value-added and end-use opportunities for Canadian pulses.