

## Appendix A: AAFC Science – Strategic Objectives and Areas of Focus

Strategic Objectives	Cereals & Pulses	Oilseeds	Horticulture	Forages & Beef	Dairy, Pork, Poultry and Other Livestock	Agri-Food	Bioproducts
<i>Increase agricultural productivity</i>	Increase the genetic potential of cereal and pulse crops  Increase cereal and pulse crop ability to achieve genetic yield potentials	Increase the yield potential of oilseed crops and mitigate the impacts of abiotic stress factors, using genetic improvement, germplasm development, the creation of new breeding tools, and variety development  Decrease the yield gap for oilseed crops by supporting integrated oilseed production systems, involving agronomy, crop protection, biology and early-generation and variety testing for crop adaptation to regional conditions	Minimize losses due to existing and emerging biotic and abiotic stresses through integrated crop production and management systems, and the development of knowledge and predictive tools  Improve yield potential and tolerance to biotic and abiotic stresses for some major horticultural crops through genetics and germplasm development	<b>Forages</b> - Germplasm and variety development in native and tame species for yield, persistence and nutritive value  - Integrated forage crop management to optimize yield, persistence and nutritive value  <b>Beef</b> - Animal feed efficiency - Reduction in animal stress - Advanced technologies in animal breeding and production	Increase the efficiency and productivity of dairy and pork production at the gene, animal and production system levels, to improve: - disease resistance - animal welfare of swine - sow and piglet productivity - lactation persistence of dairy cattle - input use efficiency for dairy and swine	Support the sector in developing cost-effective agri-food processes and new agri-food products  Enhance by-product utilization in the development of agri-food products	Increase biomass yield potential and improve feedstock availability through: - genomics - germplasm development - agronomic improvement
<i>Enhance environmental performance</i>	Improve efficiency of nutrient utilization  Develop integrated crop management (ICM) practices to reduce the impact of insects, disease and weeds on cereal and pulse production systems	Enhance sustainable oilseed production practices  Improve nutrient and water use efficiency  Develop sustainability metrics for oilseed crop production	Improve efficiency of nutrient, water and energy utilization in horticultural practices  Reduce environmental impacts of horticulture crop production through practices such as integrated pest management and integrated crop production	<b>Forages</b> - Develop industry and market-driven sustainability metrics - Increase resource use efficiency  <b>Beef</b> - Develop market-driven sustainability metrics - Reduce environmental impact	Reduce the environmental impact of dairy and pork production at the animal level, to: - reduce greenhouse gas emissions and nutrient excretion in dairy cattle - reduce nutrient excretion and odours in swine  At the production system level, reduce greenhouse gas and ammonia emissions, and improve nutrient management and efficiency of natural resource use in dairy, swine, poultry and other livestock operations	Develop greener alternative agri-food processing and preservation techniques including approaches to improve resource management, reduce waste and losses due to spoilage during production, processing and distribution	Improve sustainability of feedstock production and develop quantitative measures to support industry in the development of sustainability metrics
<i>Improve attributes for food and non-food uses</i>	Market-driven cereal and pulse genetics and production practices  Maximize the health potential of cereals	Respond to market demands and requirements for specific oilseed crop quality traits through genetic improvement, germplasm development, the creation of new breeding tools, variety development, and enhanced production methods	Address market demand for consistent supply, composition and quality traits through crop management techniques  Improve crop attributes for some major horticultural crops through genetic advances and germplasm development	<b>Forages</b> - Identification and development of novel attributes of native and tame species  <b>Beef</b> - Improve key beef quality characteristics - Market-driven quality assessment technologies - Improve beef by-product utilization - Alternatives to antimicrobials	Identify and develop value-added characteristics for pig carcass and meat quality to help improve pork quality attributes for food uses and ensure the preservation of quality throughout the value chain	Generate new knowledge of attributes that differentiate Canadian agri-food products and ingredients while meeting quality and cost requirements  Identify Canadian crops, livestock and agri-food products with bioactive or functional properties of economic interest, along with their nutritional and physicochemical properties and/or bio-functional benefits	Identify components and properties in existing crops and livestock for value-added industrial applications, and develop new purpose-grown biomass crops  Increase biomass quality through: - genomics - germplasm development - agronomic improvement
<i>Address threats to the value chain</i>	Improve safety of cereals by reducing the presence of mycotoxins  Mitigate emerging biotic threats to Canadian cereal and pulse production	Develop new knowledge and tools to mitigate factors that threaten oilseed value chains including new and emerging biotic stresses	Develop knowledge and predictive capacity to anticipate emerging biotic factors that threaten the horticulture value chain, and develop tools and practices to mitigate them  Develop the knowledge and tools necessary to meet the safety and marketability requirements for horticultural products, from production practices through post-harvest handling, storage and distribution.	<b>Beef</b> - Current and future beef value chain pathogens	Improve the safety of the dairy and pork value chains - improve the health status of cows and pigs - increase the safety of milk - reduce antibiotic use - decrease risks from manure / slurry pathogens and other compounds  Improve gut health, reduce antibiotic use and develop alternatives to antibiotics in poultry production	Identify pathogens and other chemical and biochemical threats to the food supply and generate knowledge of their ecology across the food processing value chain  Develop novel approaches to reduce the incidence of microbiological, chemical and biochemical threats to the food processing supply chain	Mitigate emerging biotic and abiotic threats to bioproduct feedstock
	<b>Biodiversity and Bioresource</b>				<b>Agro-Ecosystem Productivity and Health</b>		
<i>Increase agricultural productivity</i>	Enhance crop productivity and resiliency by providing genetic variability for genetic improvement Identify species and enhance understanding of pests and beneficial organisms that impact productive capacity Enhance understanding of the impact of environmental perturbations (e.g., climate change) on biodiversity and its impact on productivity				Water - Improve land and crop management strategies and technologies in response to water stress Climate and Air - Enhance production system performance to anticipated weather and climate impacts Land and Soil - Enable informed land-use decisions based on land suitability; increase resource use efficiencies to reduce input costs to production Biodiversity for Integrated Production Systems - Reduce impact of known pests through integrated crop and livestock management strategies		
<i>Enhance environmental performance</i>	Characterize ecological and evolutionary processes relevant to agriculture that enhance environmental performance Enhance understanding of the impact of environmental perturbations on organisms relevant to agriculture, to support development of mitigation strategies Enhance understanding and utilization of crop and livestock genetic diversity to support sustainable production				Water - Maintain/enhance quality of surface water and groundwater Climate and Air - Maintain/enhance air quality by reducing undesired inputs into the atmosphere Land and Soil - Maintain and enhance soil productive capacity; improve nutrient management; capture resource synergies and efficiencies Biodiversity for Integrated Production Systems - Maintain and/or enhance desired ecosystem functions that directly benefit agricultural production		
<i>Improve attributes for food and non-food uses</i>	Provide / utilize sources of genetic variability to improve the attributes of Canadian agricultural commodities, or to support new opportunities for food and non-food uses				Provide the sector with quantitative scientific measures that can be used to support development of environmental goods and services and sustainability metrics to preserve market access / capture opportunities		
<i>Address threats to the value chain</i>	Provide information on the incidence and movement of new pests or invasive species that pose a risk to Canadian agriculture Enhance knowledge of invasive species and pests to improve risk identification and support development of diagnostic tests Mitigate impact of pests and invasive species on production by providing science to develop and implement risk reduction strategies Provide authoritative science to support other government departments/agencies in meeting requirements of domestic legislation/regulations Mitigate genetic erosion of production systems by enhancing and conserving crop and farm animal genetic diversity				Climate and Air - Improve ability to address extreme weather risks to production; provide information to assess the agricultural production situation and extreme weather patterns to support sector and Government of Canada decision-making Biodiversity for Integrated Production Systems - Mitigate impacts from emerging pest threats; mitigate loss of habitat for beneficial organisms (e.g., pollinators)		