

# The Colorado Blueprint of Agriculture and Food

Key assets, emerging issues, and shared  
priorities for future investments in food  
and agriculture around the state



COLLEGE OF  
AGRICULTURAL SCIENCES  
COLORADO STATE UNIVERSITY

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The **Colorado Agricultural Experiment Station** conducts research that addresses the economic viability, environmental sustainability, and social acceptability of activities impacting agriculture, natural resources, and consumers in Colorado.



## And with support from the following partners:



The Colorado Department of Agriculture works to strengthen and advance Colorado Agriculture; promote a safe and high-quality food supply; protect consumers; and foster responsible stewardship of the environment and natural resources.



LiveWell Colorado increases access to healthy eating and active living by removing barriers that inequitably and disproportionately affect low-income communities and people of color.



The Colorado Food Systems Advisory Council works to advance recommendations that strengthen healthy food access for all Coloradans through Colorado agriculture and local food systems and economies.



Larimer County Economic and Workforce Development (EWD) connects people to meaningful work and businesses to talent and resources, improving our community's economic well being.



The Colorado State University College of Agricultural Sciences speaks to our institution's land-grant mission through its economic impact, cutting-edge research, and innovative education.



Colorado State University Office of Engagement connects communities around shared solutions through education, research and leadership.



The Colorado State University Extension and Outreach Food System programs engage Colorado communities through county-based agents, regional specialists, and Extension faculty. We support community-based organizations, connect stakeholders to state and federal resources, and assist in developing local and regional supply chains.



## Author Profiles



**Dawn Thilmany McFadden** is a Professor of Agribusiness and Agribusiness Extension Economist at Colorado State University, and the Associate Director of CSU's Regional Economic Development Institute (REDI). Dr. Thilmany McFadden is on the leadership team of the CSU Extension Food Systems work team and has chaired the Colorado Food Systems Advisory Council and has collaborated with several agencies and Boards of the US Dept of Agriculture.



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# EXECUTIVE SUMMARY



**A**griculture and the broader food system are major contributors to the Colorado economy. Yet, the vibrant commodities, industries, and communities that make up the state’s food and agricultural system often do not recognize their linkages or communicate effectively with one another or the public. The Colorado Blueprint for Food and Agriculture emerged as an opportunity to build bridges and strengthen the food and agricultural sectors through robust data analysis, stakeholder conversations and mapping opportunities to support linkages, policies and programs that better our industry and its surrounding communities. Ultimately, this project, its process, and its resulting publications are all intended to support community and economic development.

## THE THREE PARTS OF THE COLORADO BLUEPRINT FOR FOOD AND AGRICULTURE

**T**his project of the 2017 Colorado Blueprint for Food and Agriculture updates the 2013 Value Chain of Colorado Agriculture, expanding its reach to include a broader set of information and stakeholders. Specifically, the 2013 Value Chain of Colorado Agriculture has been expanded to include:

- 1.** An update of the economic data and a deeper look at the Value Chain of Colorado Agriculture, including analyses of additional industry subsectors and a broader set of players that have various roles in the value chain of agriculture and food.
- 2.** An integration of results and insights from the 2016 survey on Public Attitudes about Agriculture in Colorado led by the Colorado Department of Agriculture (CDA)
- 3.** A synthesis of issues identified in a yearlong community engagement exercise of regional and industry town hall meetings, designed to catalyze discussion about how these data align with the opportunities, priorities, and concerns that are top-of-mind for Coloradans.

## MISSION AND OBJECTIVES OF THE COLORADO BLUEPRINT FOR FOOD AND AGRICULTURE

The mission of this Colorado Blueprint for Food and Agriculture project was to:

- Understand opportunities and challenges resulting from changing public attitudes;
- Assess opportunities for food system policy to address challenges and needs;
- Document, assess and highlight key linkages in the industry supply chain and infrastructure;
- Develop priorities for capacity building, investment and innovation across all of the state's agriculture and food stakeholders;
- Enhance Colorado State University's knowledge of Colorado-specific research and engagement needs, to support opportunities for all research and outreach units of CSU, both on and off campus.

From the perspective of the range of stakeholders in agriculture and food within the state of Colorado a broader set of cross cutting objectives were framed and explored in the Colorado Blueprint for Food and Agriculture:

1. Creating, retaining, and recruiting agricultural and food firms;
2. Developing workforce and youth to support agricultural and food sectors;
3. Promoting the Colorado brand, ensuring it reflects the unique qualities of the agriculture and food sectors;
4. Supporting a business- and consumer-friendly regulatory environment;
5. Addressing how scale impacts market performance, access, and opportunities;
6. Innovating and supporting new technology for agricultural and food businesses;
7. Improving access to resources and capital for agriculture and food firms; and,
8. Integrating agriculture and food with healthy, vibrant communities.

These broad objectives build upon a core set of six cross-cutting economic development issues that were laid out by the state's Office of Economic Development and International Trade (OEDIT) in its bottom-up economic development plan for the state known as the "Colorado Blueprint" and addressed for the key industry of food and agriculture in the 2013 Value Chain of Colorado Agriculture.

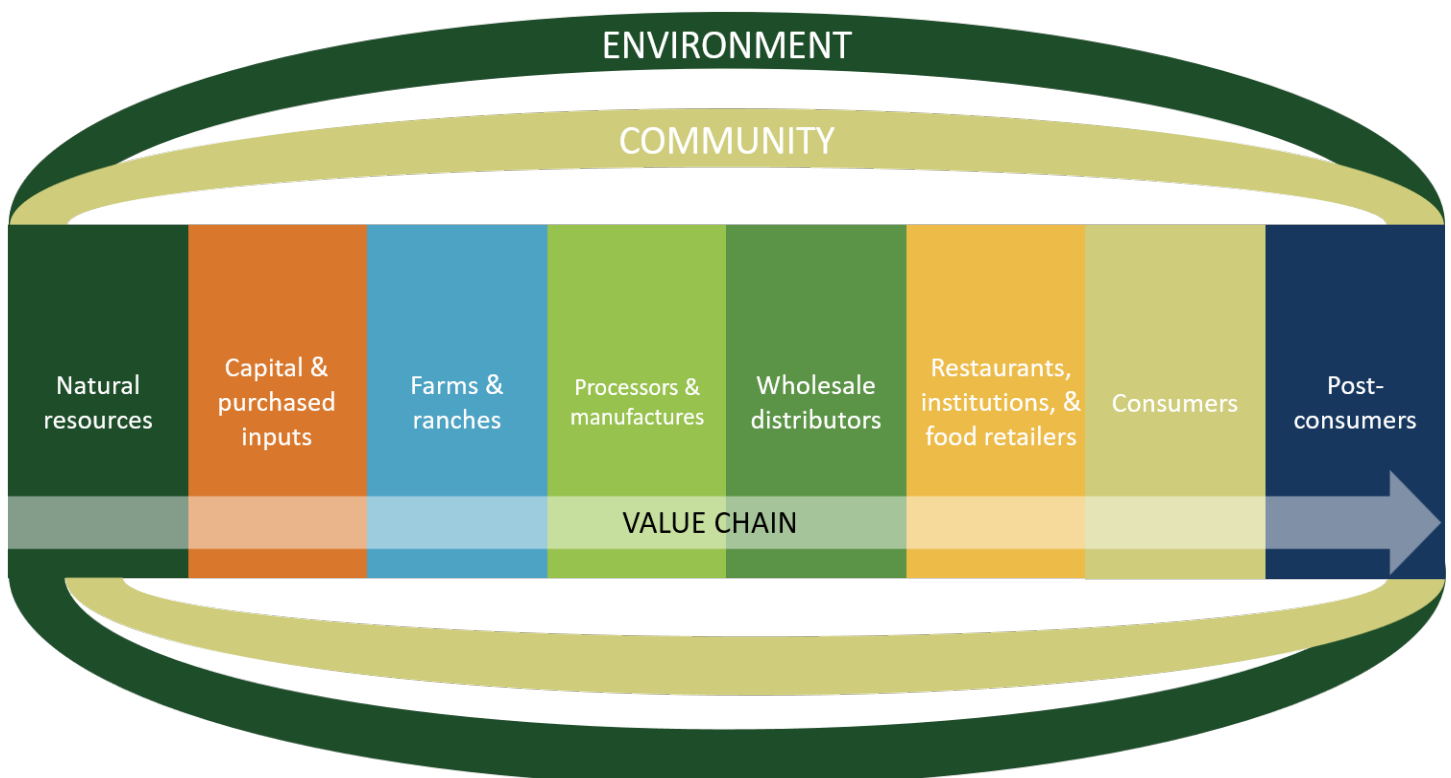
Looking at the value chain of Colorado agriculture in light of these broad economic and community development objectives reveals numerous challenges and opportunities overlapping across various industry sub-sectors. For example, in many parts of the value chain, the availability and quality of both wage laborers and skilled tradespeople is crucial to the workforce of the future. Colorado also has underexploited areas of excellence and global leadership in agricultural innovation, from applications of scientific research, to new models of business-to-business transactions, to value-based product development in emerging consumer markets. Further, Colorado's agriculture, food, and beverage sectors can play a pivotal role in establishing the state's image as a brand and a destination for healthy and active lifestyles.

## COMMUNITY ENGAGEMENT OF THE COLORADO BLUEPRINT FOR FOOD AND AGRICULTURE

An essential component of the Colorado Blueprint for Food and Agriculture was an extensive community engagement process. In total, across the state, almost 250 people attended 13 regional town hall meetings, representing 158 organizations. In addition, four industry town hall involved over 110 attendees, representing 47 organizations. Throughout 2017, ten public presentations, each of which included 25 to 250 participants, helped to spread the word about the engagement process. As evidence of the interest in the project, 395 individuals asked to stay connected to what was happening with the Blueprint, 1,122 unique page views were recorded on the project website, with a total of 1,553 views between January and August. After the presentation of the draft report was made at the CSU Ag Innovation Summit in September, 554 more views have been recorded, with 74 community members providing feedback on the initial recommendations and priorities (see: <http://foodsystems.colostate.edu/research/colorado-blueprint/community-engagement/>).

### DEFINING THE VALUE CHAIN OF COLORADO AGRICULTURE WITHIN THE CONTEXT OF COLORADO COMMUNITIES AND OUR SHARED NATURAL ENVIRONMENT

The idea of a value chain refers to the series of steps or linkages that turn raw materials and other inputs into final products or services delivered to end users. To expand on the 2013 Value Chain study, a broader set of linkages was defined for this Blueprint. The agricultural value chain is now defined as the flow of inputs, starting from the natural resources utilized by agricultural producers all the way through consumer household, and beyond, including how food waste is handled or packaging is recycled. This recognizes that agricultural producers and food enterprises are at the core of the value chain, but all are embedded within the communities and the environment of our state, acting as key stewards, employers and community leaders on a variety of public issues (see Figure).



## NATURAL RESOURCES AND INPUTS TO AGRICULTURAL PRODUCTION

Inputs to agricultural production include productive capital—such as labor, land, water, equipment, genetics, and financing—as well as consumable inputs such as fertilizer, pesticides, electricity, and fuel. Annual expenditures by Colorado farms and ranches in each category represents an upper branch of the value chain, businesses and workers who create value by providing inputs to agricultural production.

**USE OF CAPITAL:** Payment of rent by Colorado farms and ranches to non-operator landlords for use of agricultural land was \$96 million in 2016. In recent years, annual fees paid by Colorado ranches to graze livestock on federal public lands are estimated at \$2 million per year. Annual rent paid by Colorado farms and ranches to non-agricultural water rights owners for use of their water is estimated to be at least \$53 million. In 2016, Colorado farms and ranches paid \$542 million in salaries, wages, and benefits to roughly 38,000 full time and part time on-farm employees. In 2016, agricultural equipment manufacturers sold an estimated \$236 million and farm and garden machinery dealers sold an estimate \$334 million representing investments by farm and ranch enterprises in their physical capital stocks. Also, in 2016, Colorado farms and ranches made interest payments of \$307 million (on principal of approximately \$4.5 billion) to maintain financing from private and public lenders.

**ON-FARM INPUTS:** Some inputs, such as seed, feed, or young livestock, are by their very nature produced on farms. Thus, the value of expenditure by the farm or ranch that purchases them also counts as revenues for the other farm or ranch that sells them. In 2016, Colorado farms paid seed farms and seed companies \$195 million for seed. In 2016, Colorado livestock operations paid farms and feed mills \$1.16 billion for feed. In 2016, Colorado livestock operations paid other livestock operations \$1.12 billion for live animals. Given the capacity of Colorado feedlots exceeds the supply of animals available from within the state, about two thirds of the cattle being placed on feed in Colorado are purchased from out of state and constitute “inshipments” to Colorado.

**MANUFACTURED INPUTS:** An additional class of purchased inputs consists of those originating from outside the farm sector, and thus suppliers of these inputs make up branches that are higher up the agricultural value chain. In 2016, Colorado farms paid \$241 million for fertilizers and \$169 million for pest control products. In 2016, Colorado farms and ranches paid fuel suppliers \$198 million for fuel and oil products, and they paid Colorado utilities and Rural Electric Associations \$105 million for electricity.

**SERVICES PROCURED:** Farms and ranches also procure services. They paid \$256 million in 2016, mostly to local businesses and contractors, for repair and maintenance services. They paid \$67 million for machine hire and custom work, largely to other farms and ranches, as well as to specialized local businesses and contractors. Colorado farms and ranches paid \$75 million to contract labor companies for contract labor services. Colorado farms and ranches paid \$183 million in transportation, storage, and marketing expenses to trucking companies, grain elevators, and other such service providers.

**PUBLIC SERVICES:** In order to support state and local services such as country roads, bridges, public weed and pest control, etc., taxes are assessed—in particular on those capital goods, such as land and vehicles that are associated with activities most likely to utilize and benefit from such public services. Thus, in 2016, Colorado farms and ranches paid \$146 million in property taxes and \$15 million in motor vehicle registration fees to county and state governments.

**INSURANCE AND OTHER FARM AND RANCH EXPENDITURES:** Finally, Colorado farms and ranches paid an additional \$709 million designated to other “miscellaneous expenses,” including expenditures on tools and supplies, miscellaneous livestock-related expenses such as veterinary care, business-related expenses,



and insurance. In 2015, premiums paid to insurance companies for crop and livestock insurance totaled \$173 million. Federal crop insurance subsidies paid \$104 million of that total. Colorado farms and ranches paid the other \$69 million. As well, in recent years, Colorado farm and ranch operator households spent between \$110 to \$178 million on health insurance premiums and between \$71 and \$114 million in out-of-pocket health care expenses.

## AGRICULTURAL PRODUCTION

Sources of revenue for Colorado farms and ranches totaled close to \$7 billion in 2016. These vary significantly, but each represents a vertical branch down the value chain, as that particular output or service provides an input for manufacturing or is marketed to final users.



**CROPS:** The largest share of crop production in Colorado is devoted to crops intended for consumption by livestock. In 2016, Colorado farmers received \$920 million for such feed and forage crops. Of that, \$496 million was for corn, \$296 million was for hay, and approximately \$100 million was for sorghum, millet, barley, and oats combined. A significant share of the feed crop harvest never leaves the operation where it was grown, a portion is sold directly to neighbors, and some enters more formal marketing channels. The high level of demand by cattle feeding and ethanol production accounts for virtually the entire corn grown in Colorado plus an estimated 80 to 90 million bushels shipped into the state each year.

Wheat is the primary food grain grown in Colorado, and was worth \$294 million in 2016. Oilseed production is smaller: In 2016, Colorado farms received \$18 million for production of oilseed crops, primarily sunflower. Particular regions of Colorado have proven favorable for fruit and vegetable crops. In 2016, Colorado farmers received \$175 million for potatoes, \$71 million for other vegetables, and \$27 million for fruits: making a total of \$272 million for all fruits and vegetables combined. Historically, sugar beets and sugar processing have played prominent roles in the development of Colorado agriculture. In 2016, Colorado growers received \$46 million for their sugar beet crop. Greenhouse and nursery crops are typically raised for residential, recreational, and commercial landscaping, for gardening, or for indoor ornamental use. In 2012, the last year for which USDA reported data, Colorado greenhouse and nursery operations received \$254 million for production and sale of a variety of horticultural, landscaping, and ornamental plants. With recovery of real estate and construction, sales likely rebounded above \$300 million by 2016.



**LIVESTOCK:** Livestock production has historically been a major economic activity in Colorado, due to extensive rangelands across the high plains, the inter-mountain valleys, and the western slope. The livestock most commonly produced in Colorado is cattle, for both beef and dairy. In 2016, Colorado beef cattle operations received almost \$3.1 billion for marketing of beef cattle, and \$1.9 billion for harvested or “production” of beef. Dairies received \$655 million for milk production. Hog operations received \$182 million for marketings of hogs. Colorado is the leading U.S. state in production of sheep and lamb. In 2010 (the last year for which separate figures are available) Colorado sheep and lamb operations received \$111 million for sheep and lamb marketings and \$3.7 million for wool production. Other livestock include poultry production, with Colorado producers receiving \$101 million for sale of eggs and poultry in 2016. The equine industry still serves some roles in production agriculture, but raising horses for recreation is economically more important. In 2016, Colorado farms and ranches received about \$32 million for sales of horses. In Colorado, as a landlocked state, commercial aquaculture is not a major activity, but sold \$2.2 million of raised trout in 2016. Honeybees may be insects, but they produced honey worth \$2.8 million in 2016.



**SERVICES PROVIDED:** Farms and ranches also realize revenues from services provided. In 2016, Colorado farms and ranches received \$78 million for machine hire and custom work, largely provided to other farms and ranches. In 2012, according to the the USDA Census of Agriculture, Colorado farms and ranches received \$28 million for providing agtourism and recreational services.



**REVENUES FROM RISK MANAGEMENT SOURCES:** Farms and ranches benefit from a range of risk management tools and strategies. Some risk management is provided by the federal government as part of U.S. public policy. These include commodity subsidies, conservation payments, and disaster payments, as well as premium subsidies to help farms and ranches purchase crop and livestock insurance coverage. Colorado farms and ranches received \$234 million from USDA commodity and conservation programs in 2016. On policies held by Colorado farms and ranches, crop and livestock insurance indemnities were \$106 million in 2015, given that the premium for these policies was partly subsidized by the federal government, this resulted in a net revenue of \$37 million in 2015.



**OFF-FARM INCOME:** Finally, it is important to consider that, in addition to income from their farm and ranch operations, households of Colorado farm and ranch operators had an estimated off-farm income of \$3.4 billion in 2016, from members of the household working in other sectors of the economy. In addition, households of Colorado farm and ranch operators enjoyed home consumption of about \$16 million worth of their own crop and livestock products in 2016. Colorado farm and ranch operator households realize a \$321 million value of farm residential dwellings in 2016. Finally, for those who live and work in agriculture there is a less tangible value of the agrarian lifestyle that comes with operating a farm or ranch.



**WORKFORCE:** Assessing the Colorado workforce engaged in production agriculture is challenging. There are roughly three categories of those working on farms and ranches: owner-operators; employees (full time and part time); and contractors (including both skilled contractors and contracted labor).

According to the 2012 Census of Agriculture, on Colorado's 37,054 farms and ranches, there were 59,479 primary operators. Of these, 23,705 describe farming as their primary occupation, while the remaining 35,774 have another primary occupation or are retired and work on the farm or ranch as part time operators. According to the Census of Agriculture, 7,393 of the 37,054 farms and ranches in Colorado hired at least one employee, including 15,454 as full time and 23,429 as part time employees. Machine hire and custom work, repair and maintenance, and veterinary services all represent serviced provided under contract. Those workers would be counted in their primary occupation elsewhere. Finally, no data was found regarding the numbers working as contract labor on Colorado farms and ranches. Other sources estimate that there were 28,000 jobs in production agriculture in Colorado in 2016. Annual job growth in the farm and ranch sector was fairly stagnant, at about 1 percent. Total workforce earnings were over \$1 billion.

## DOWN THE VALUE CHAIN: MARKETING, PROCESSING, AND MANUFACTURING

The vast majority of agricultural products are sold to intermediaries in the value chain who are able then to create additional value with those products, either by transporting and marketing them, by processing them, or by manufacturing products that use them as inputs. Out of a total of \$16.9 billion in sales in 2016 by Colorado agricultural commodity marketing and food and beverage manufacturing, an estimated \$7.1 billion (42 percent) were sold in Colorado and an estimated \$9.8 billion (58 percent) were sold out of state; of those an estimated \$1.6 billion (10 percent of the total) were exported.

**AGRICULTURAL COMMODITY MARKETING:** Commodity merchants made an estimated \$216 million in sales in Colorado in 2016. In 2016, about \$1.6 billion worth of agricultural exports from the U.S. are estimated by the USDA to have originated from Colorado.

“The vast majority of agricultural products are sold to intermediaries in the value chain who are able then to create additional value with those products.”

**CROP PROCESSING:** Grain and oilseeds mills sold \$344 million in 2016. Colorado ethanol plants sold an estimated \$141 million in 2016. Colorado sugar beet refineries sold \$81 million of sugar and co-products in 2016. Manufacturers of animal feeds and foods sold \$1.2 billion in 2011. Of this, livestock feeds accounted for \$592 million and pet foods accounted for \$568 million. Fruit and vegetable processors in Colorado made sales of \$315 million in 2011.

**ANIMAL PROCESSING:** The sales of the animal slaughter and meat packing industry in Colorado were almost \$3.4 billion in 2011. Colorado firms produced only \$13 million of tanned hides and leather products in 2016. Dairy product manufacturing firms in Colorado accounted for \$2.3 billion in sales in 2016. Of this, cheese manufacturing accounted for \$1.9 billion.

**OTHER FOOD MANUFACTURING:** Colorado food manufacturers of baked goods and confections sold \$1.6 billion in 2016. Colorado food manufactures across the range of other product categories not already considered sold \$1.2 billion in 2016.

**BEVERAGE MANUFACTURING:** Colorado beverage manufacturers sold \$5.4 billion in 2016. Of that, beer was the largest beverage manufacturing sector, at \$3.9 billion in 2016.

**WORKFORCE:** Almost 35,000 were employed in agricultural commodity marketing and food and beverage manufacturing in Colorado in 2016. Employment was robust, with job growth in these sectors of 17% percent between 2012 and 2016, and with total earnings of almost \$2.1 billion.

## WHOLESALE

Wholesalers are integral to the marketing and logistical functions of the value chain. Wholesaling involves the marketing arrangements as well as the storage, transportation, and distribution of agricultural and manufactured food products from suppliers or manufacturers to the retail outlets where they are offered for final retail. Food and beverage merchant wholesalers had estimated sales of \$3.7 billion in 2016, although this likely underrepresents the total wholesale activity within the agricultural value chain as many of the major retailers are increasingly vertically integrated up the value chain, handling their own distributions.

**WORKFORCE:** Over 20,000 were employed in the commodity marketing and wholesale sectors in Colorado in 2016. Employment in these wholesale sectors is very robust, with job growth of 19 percent between 2012 and 2016, significantly outpacing a job growth of 6 percent nationally. Wholesale has the highest average earnings per job, at over \$70,000, of all of the major segments of the value chain. Total earnings were \$1.1 billion in 2017.

## COLORADO CONSUMERS AND THE RETAIL END OF THE VALUE CHAIN

Colorado consumers' retail food and beverage expenditures were estimated to be \$30.1 billion in 2016, split among three broad categories: \$13.3 billion on food consumed at home, \$13.7 billion on food eaten away from home, and \$3.1 on alcoholic beverages (both at home and away from home). The five largest food retailers nationwide—Walmart, Kroger (King Sooper and City Market stores), SuperValu (Albertsons stores), Target, and Whole Foods—accounted for an estimated \$320 billion in food sales, or 47 percent of the total \$685 billion estimated annual sales of U.S. food and beverage stores (U.S. Census, 2016). We can expect a similar share of retail by these big five in the state of Colorado. Given that these retailers source their food products from all over the country and even the world, it is only reasonable that in most product categories, the vast majority of goods sold in Colorado originate outside of Colorado.

**FOOD AND BEVERAGE RETAIL:** Extrapolating USDA national per capita food and beverage expenditure estimates to the Colorado population we calculate that Colorado consumers spent \$30.1 billion on food and beverage in 2016. Away-from-home expenditures on food and beverage were 53 percent of the total, meaning that Colorado consumers now spend more on food and beverage consumed away from home than on food and beverages consumed at home. Based on other data sources, supermarkets and other types of food and beverage retail stores sold an estimated \$13.6 billion in 2011. Food service establishments in Colorado were estimated to have sold \$14 billion in sales in 2016. Of that, full service restaurants accounted for just over half, at \$7.2 billion.

**GREEN INDUSTRY RETAIL:** Colorado's green industry reported \$2.1 billion in sales 2016. Since 2011, the industry has grown by 24%, outpacing the economic growth of the state during the same time period by 8%. Landscaping services contributed \$1.7 billion in sales. Nursery, garden center, and farm supply stores have a contribution of \$228 million in sales. Golf courses and country clubs accounted for \$525 million.

**LOCAL FOODS:** Direct sales of locally grown farm products in Colorado were estimated to be \$20 million in 2012 (according to the USDA Census of Agriculture). Intermediated direct sales—those made through established retail and food service channels—are estimated to be three times this amount, or about \$60 million, but cannot be measured directly. Both of these are expected to have grown significantly since 2002. Together, direct and intermediated retail sales of local foods are less than one percent of overall food retail for at home consumption.

**WORKFORCE:** Over 342,000 Coloradoans are employed in the food and beverage retail, green industry retail, and food service retail sectors in Colorado. Job growth in these sectors between 2012 and 2016 was a robust 15 percent. Total earnings in these retail sectors were over \$9 billion.

“Colorado consumers’ retail food and beverage expenditures were estimated to be \$30.1 billion in 2016”

## PLOTTING OPPORTUNITIES FOR COLORADO FOOD AND AGRICULTURE STAKEHOLDERS

Based on the combined findings from the updated Value Chain of Colorado Agriculture as presented in this report, the survey of Public Attitudes about Agriculture in Colorado, and the community and industry town hall meetings summarized in this report, several key themes and opportunities have emerged. A rich set of industry, community, government, non-profit and academic partners are engaging in both of the following:

- historically strong agricultural production activities;
- innovative and emerging markets that seek to integrate technology, consumer preferences, and strategies to ensure that quality of life continues to be enhanced by the presence of a strong natural resource base, agricultural sector, and food environment.

However, to maintain this strong position as a national leader in agriculture and food markets, policy and development, there are remaining opportunities to invest further in moving the sector forward in the future:

1. The Colorado ag and food economy will best thrive with targeted investments and innovative models of workforce and youth development that recognizes the strong employment and entrepreneurial opportunities that will demand high skill workers and managers.
2. A growing, engaged urban consumer base creates new opportunities throughout the industry's value chain for new businesses to pilot emerging market concepts while anchor agribusiness players pivot into additional segments for which Coloradans and trade partners signal growing demand.
3. Part of the opportunity to secure new markets and provide opportunities for future entrepreneurs (including the next generation of agriculture) is to assure there is adequate infrastructure to attain the efficiency and performance to thrive in competitive global and local markets.
4. New models and markets for agriculture and food will continue to require scientifically sound translational research and commercially competitive technology transfer to address the grand challenges of providing a healthful, bountiful, and safe supply of food to growing populations of local and global consumers, all with a limited set of natural resources.
5. Given the myriad opportunities presented by changing markets and given Colorado's unique position in several key sectors of the industry, it will only become more essential that there is collaboration and communication across the food system with respect for the varying needs of stakeholders, regardless of location, size, product focus, or values. No longer can the players in the agricultural and food value chain stay within their historically defined silos if we are to leverage the shared opportunities that the entire system offers.

