



Salad bowl full of locally grown vegetables and flowers from Feedback Farm, summer 2010.

PHOTO COURTESY THEO DELACA, FEEDBACK FARM

ASSESSING FOOD SECURITY IN FAIRBANKS, ALASKA

A Survey Approach to Community Food Production

A Senior Thesis

Presented to the faculty of the School of Natural Resources and Agricultural Sciences University of Alaska Fairbanks and the Senior Thesis Committee: J.A. Greenberg, Chair; S.C. Gerlach; P.J. Fix; and C.E. Lewis

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Abstract

Since the arrival of non-Native peoples to Alaska, the state has heavily relied on importing most food. Food security concerns have been raised related to supply disruptions, cost, and health. This thesis was designed as a pilot study and intended to provide information on local vegetable and fruit production in the Tanana Valley. The results from the study could inform subsequent studies that determine state vegetable and fruit production. Commercial vegetable and fruit producers in the Tanana Valley were surveyed. The response rate was 38.5%. The survey provided insight into characteristics of producers, production, and marketing practices. Increasing crop production in the Tanana Valley is possible, but measuring current production may require a more complex measuring system that is more consistent with producer practices. Alaska faces many challenges if it is to transition from an un-integrated food system to a more comprehensive food system that generates value to local communities.

Introduction

For more than a century, since the arrival of non-Native peoples to Alaska, most Alaskans have relied on imported foods to satisfy their food needs. With more of the state's population moving from rural to urban centers, the statewide reliance on imported food is expected to grow. The state's population has grown over the past several decades from activities such as resettling of farming families during the Great Depression of the 1930s (Lewis and Pearson 1998), World War II (Money 2009), and the Alaska oil pipeline project of the 1970s (City-data.com n.d.). With population growth, the increased demand for food has resulted in an increase in imported foods. There have been various estimates of how much food Alaska imports. According to data compiled by the U.S. Department of Agriculture (USDA), National Agricultural Statistics Services (NASS), Alaska currently imports 98% of its food, which raises the question of "how food secure Alaska is or can be" (n.d.). The World Health Organization defines being food secure as "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (World Health Organization 2010). An increased reliance on imported food sources weakens Alaska's food security.

Food security applied to Alaska takes on additional dimensions. In Alaska, the definition of food security can be extended to include availability of food that is both affordable and nutritious (Meadow 2009). One concern in Alaska with respect to food security is the possibility of a disruption (e.g., volcanic eruption) in the food supply (Money 2009). Another concern relates to the costs associated with increases in transportation and fuel costs that make importing food expensive (Francis 1967 and Fried 2010). These additional dimensions of food security, coupled with the concerns of a disruption in the food supply chain and the rising cost of importing food to Alaska, speaks to the current food system in the state.

A food system that is integrated in nature, one where a significant part of the local food system is derived from locally grown foods for the benefit of the producers, consumers, and local economy, is not prominent in Alaska. The current food system in Alaska is, by and large, un-integrated. That is, food is imported into Alaska, payment for food flows from consumers to food outlets to Outside. In an integrated food system, not only is food grown locally, but money used to purchase the food remains in the state. A more integrated food system would help support local economies and control costs associated with transportation. An integrated food system could promote a small- and mid-scale agricultural production system that builds local farm economies and is linked to local markets. In addition, an integrated food system would provide education to individuals on about how they can grow nutritious food for themselves and their families.

A transition to an integrated food system would reduce the concerns over disruptions in the food supply chain and in the high costs of importing food to Alaska—today and in the future. Ultimately, Alaska's food vulnerabilities and food

security concerns may be reduced if an integrated food system is developed. In order to move toward a more integrated food system however, an understanding of current food production in Alaska is needed.

The current method to measure the production of food in Alaska is through a bi-annual survey conducted by the USDA's NASS called the Alaska Acreage & Production Survey (OMB No. 0535-0002). This survey does capture gross levels of state-wide production, although the instrument does not adequately capture what is being produced locally for local consumption. Therefore, a method for determining local food production is needed. Acknowledging the fact that measuring production at a local level is a more involved process, I chose to develop a pilot study (via a survey instrument) designed to generate a snapshot of local production of vegetables and fruits in the Tanana Valley of Alaska's Interior region. My goal for this study is to establish a baseline for future studies of various aspects of agricultural production statewide that can be measured annually.

Background/History

During the latter part of the eighteenth century, as the first European settlers were establishing agriculture in the eastern region of North America, Russian settlers are believed to be the first non-Native inhabitants to grow crops in what we now know as Alaska. There are accounts from southeast and interior Alaska from as early as 1765 of small-scale agricultural activities in the form of gardens (Loring and Gerlach 2010). However, little is known about the agricultural activities among Native communities in Alaska's Interior before the turn of the twentieth century (Loring and Gerlach 2010).

As arable lands were quickly claimed in the continental United States during the latter part of the nineteenth century, people traveled north to a territory of the United States that would one day become the state of Alaska. Alaska's path to statehood originated with U.S. Secretary of State William Henry Seward. Secretary Seward (1861–1869) negotiated the purchase of Alaska for the United States from Russia for \$7.2 million—or two cents per acre (*History of Alaska* 2010). After first becoming a U.S. district on October 18, 1867 and then an official U.S. territory on August 24, 1912, Alaska became the 49th state on January 3, 1959.

Agriculture in Alaska has not developed in a manner similar to areas throughout the lower forty-eight states. The climate and isolated nature of Alaska challenged and continues to challenge agricultural production. As with the Gold Rush and other mineral extraction activities, Alaska agriculture as an industry has consisted of brief cycles of growth and success, followed by waning interest and failed endeavors over the past century.

In 1897 while Alaska was still a U.S. district, the federal government, through the Office of Experiment Stations, determined that 15 million acres had the potential to support agriculture in Alaska (Lewis and Pearson 1998). In 1898, Charles Georgeson, a high-latitude farming expert and head of the U.S.



Charles Georgeson with apple trees in Alaska.

—AGRICULTURAL EXPERIMENT STATION PHOTO COLLECTION, UAF RASMUSON LIBRARY ARCHIVES, ACCESSION #68-4-1163

Agricultural Experiment Stations at the time, was sent to Alaska to establish and oversee seven experiment stations and to test the viability of agriculture in the northernmost region of the United States (Lewis and Pearson 1998). Within five years, Georgeson reported to the federal government that agriculture was indeed possible in Alaska. Georgeson and Sheldon Jackson, a minister turned educator, were successful at convincing many families from the contiguous United States of the agricultural potential in Alaska. By 1929, well before the New Deal program brought American families to settle in the Matanuska Valley, there were already 500 farms in the state (Loring and Gerlach 2010). By the height of the Great Depression, however, all but two of the original Alaska experiment stations were closed due to a lack of federal support (Lewis and Pearson 1998).

Throughout the twentieth century, the low cost of fuel and the development of new technologies made it more affordable to import food to Alaska. In-state agricultural production increasingly struggled to compete with imported foods, adding to the woes of Alaska agriculture as many farming operations closed (Money 2009). The relatively small state population, in

combination with urbanization and a general lack of interest in farming, further contributed to difficulties with the viability of Alaska's agricultural production, marketing, and distribution systems.

At the turn of the twentieth century, only about 63,000 people lived in Alaska (Merriam 1901). The Alaska market was small because of a small resident population, the great land area, and the transportation infrastructure to efficiently move agricultural goods to market did not exist. By the mid-1980s, the state's population had grown to a little over a half million people. Although the market was larger and a few transportation routes existed, the Rail Belt and the Alaska Highway system, for example, interest in farming remained low, as most of the existing population moved to Alaska from urban areas in the lower forty-eight states and elsewhere with no farming background (Haycox 2002).

In 2007, there were about 680 farms in Alaska (USDA 2009). There are less than 900,000 acres of land in farms today, which is far less than the early federal government estimates of 15 million acres identified as having agricultural potential. On the Seward Peninsula, reindeer herding has yet to become a successful industry, although a market study by researchers at UAF's Reindeer Research Program is underway to see if there is demand for reindeer products (Richardson 2010). Of the many dairies that once operated in the state, only two private facilities remain. Also, several large-scale grain projects over the years have struggled to remain viable. Many farms still grow vegetables and some fruits—sold primarily during the summer months at popular farmer's markets, through community supported agriculture¹ (CSA) organizations, local retail stores and restaurants, and directly from the farm to consumer. Agriculture is alive in Alaska, but many challenges from the past are ever-present (Francis 1967).

Literature Review

Few studies have investigated the issue of food security in Alaska. In Alison Meadow's dissertation "Evaluating and designing urban food systems: The role of local initiatives" (2009), she asserts that if we are to close the gap on "food

1. Community Supported Agriculture: Defined as a food production and distribution system that directly connects farmers and consumers. Consumers buy "shares" in a farm's harvest in advance. Source: http://localfoods.about.com/od/localfoodsglossary/g/csa_glossary.htm



2010 scene from Wild Rose Farm, a modern biodynamic farm near Fairbanks.

PHOTO COURTESY WILD ROSE FARM.

insecurity"—referring to people not having access to sufficient amounts of nutritious foods as part of a healthy lifestyle—more research in the area of local food systems is needed. In the contiguous United States, the average distance that food is transported from field to market is 1,500 miles (Pirog and Benjamin, 2003), although this distance is greater in places such as Alaska, where the majority of food is flown, trucked, or barged in. If any event occurred to disrupt the supply of food imports to Alaska, it has been estimated there might be about a three-day supply of food on store shelves as a result of "limited in-state warehousing"². In addition, Alaska has the smallest state agricultural industry despite being the largest state by area. In the past several years, 2003-2008, Alaska has produced just over \$30 million in agricultural products annually (Benz et al. 2009). Based on cash receipts of all 50 states, the USDA ranks Alaska last (USDA n.d.). These numbers are a reality that many Alaskans, who rely on imported foods, have become accustomed to. Yet, with the rising costs of importing foods as a result of current political, economic, and environmental challenges, food security is gaining importance.

In recent years, a movement toward eating locally produced foods has been developing throughout the United States, with an emerging movement in Alaska as well (Martinez et al. 2010). Currently, among state and federal agricultural agencies, agricultural producers, and the general public, a consensus on the definition of "locally" produced food does not exist. The disagreement appears to be regarding the distance between the grower and consumer. In essence, people disagree on how far an agricultural product can be grown from the consumer and still be considered to be locally produced. However, based on

2. Dissertation presentation on March 2, 2010 by Philip A. Loring, Ph.D. candidate.

geographical proximity, the Food, Conservation, and Energy Act of 2008 (2008 Farm Act) defines locally produced food to be “any agricultural food product that is raised, produced and distributed in ... the locality of region in which the final product is marketed, so that the total distance that the product is transported is less than 400 miles from the origin of the product; or ... the state in which the product is produced.” Concerns over the distance that most food travels, relating in part to the carbon footprint, as well as to issues of food security, illustrate only a couple reasons for the growing interest in local foods. A study performed by the Food Marketing Institute (2009), designed to uncover consumer motives for preferring locally produced food, found that consumer preferences have been found to be linked to many perceptions. For example, 82% of respondents were found to prefer the freshness of local food, 75% of respondents had a desire to support the local economy, 58% of respondents preferred the taste of locally produced food, and 35% of respondents were concerned over the environmental impact of transporting foods across great distances.

“The local food movement across the U.S. represents a fundamental shift away from national and global food systems.”

Locally produced foods (e.g., produce) are generally sold at a higher price than imported foods that can be found at local grocery stores. Consumers who are willing to pay more for locally grown foods tend to “place importance on product quality, nutritional value, methods of raising a product and those methods’ effects on the environment, and support for local farmers” (Martinez et al. 2010). The local food movement across the U.S. represents a fundamental shift away from national and global food systems. Support for local farms and food systems and consumers wanting to know where their food comes from reflect this growing movement (Pirog 2009).

Today, locally produced foods in the Tanana Valley are generally sold either directly to the consumer or through local retailer/foodservice organizations. Farmer’s markets are one of the most popular and growing sectors of local food marketing. According to the USDA’s Agricultural Marketing Service (Diamond and Soto 2009), the number of farmers’ markets nationwide rose from 2,756 in 1998 to 5,274 in 2009. CSA operations are another important and rapidly increasing form of “direct-to-consumer” marketing of locally produced foods, with the number of CSAs climbing from 400 nationwide in 2001 to estimates of over 1,400 in 2010 (Martinez et al. 2010). Other forms of “direct-to-consumer” marketing include roadside farm stands, direct from farm (e.g., pick your own), and community gardens. The 2007 Census of Agriculture stated the total U.S. sales in 2007 for “direct-to-consumer” marketing totaled \$1.2 billion dollars, up from \$551 million in 1997 (USDA 2009).

Farm to school programs, where farms supply food to local school meal programs, are estimated to have doubled since the 2005–2006 school year, with an estimated 2,051 farm to school programs in 2009 (Martinez et al. 2010). Martinez et al. also note that although the most common forms of “direct-to-consumer” marketing represents but a small proportion of the total sales of agriculture in the United States, they are rapidly growing—as more people choose to eat locally produced foods. The growth of the local food movement requires growth in the number of small and mid-size farms, although such farms are faced with multiple policy, production, and economic obstacles as they attempt to expand production.

The USDA defines a farm as “any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold” over the course of a year (USDA 2009). This definition is likely to exclude some small local farms that are important contributors to local food production. A small farm is considered a farm with total sales of less than \$50,000. These small farms that support the local food markets are faced with many limitations in meeting the growing demand for local food. These limitations include capital for farm investment, “capacity constraints ... and lack of distribution systems for moving local food into mainstream markets; limited research, formal and informal education, and training programs for marketing local food. In addition, there are multiple uncertainties related to regulations that may affect local food production, such as food safety requirements, land use and zoning changes, and changes in government programs designed to support local food production (Martinez et al. 2010). Local, small-scale farmers have reason to be optimistic as an increasing number of local, state, and federal government programs have committed resources to help overcome the challenges they currently face in establishing or expanding their farms for the benefit of local food systems.

Methods

The objective of this project was to generate a snapshot of local vegetable and fruit production in the Tanana Valley. The ability to provide insight into local food production was more important than generating a statistically rigorous data set. Therefore, multiple platforms were relied on. The development and implementation of the survey and the followup with growers were performed via telephone calls, in person, mail, and e-mail. The end goal was to get input from as many producers as possible.

In consultation with agricultural and other professionals, I developed the initial questions for the survey. The questions were guided by the project’s objective. It has been recognized that mailed survey response rates are lower with longer surveys than with shorter surveys (Dillman 2007). In this interest, it was considered important to design the survey so that only questions necessary to complete our objective were asked (e.g., what crops did you grow in 2010?, how many acres did you

grow produce on in 2010?, and what were your gross sales in 2010?). I initially established an arbitrary goal of keeping the survey to ten questions, although it quickly became apparent that developing an appropriate survey instrument for producers in ten questions or less would be inadequate to fully address local production. With input from my committee and informal interviews with a few Tanana Valley producers, I expanded the survey questions to include 18 production related questions, and a few demographic questions. I then refined the wording of the questions with my committee. Once a draft of the questions had been finished, I sought feedback from local vegetable and fruit producers as well as local, state, and federal agricultural professionals (i.e., UAF SNRAS faculty, Alaska Community Agriculture Association, Alaska Department of Natural Resources (DNR), UAF Cooperative Extension Service (CES), and Alaska Agricultural Statistics Service). Along with the draft of the survey, I sent a letter introducing myself and explaining the project, its purpose, and the objectives. I requested feedback on the wording and quality of the questions, and whether any important questions were missing. The feedback was used in revising the survey in an iterative process. It is important to note that the survey questions did not extend to the cost of production as I was not attempting to determine profitability or economic feasibility of growing crops in the Tanana Valley.

Prior to finalizing the survey, select faculty at UAF familiar with agriculture and local vegetable and fruit producers reviewed the survey as a final check on clarity and quality of the questions. Reviewers were requested to complete the survey assuming the perspective of a Tanana Valley producer. Based on their interpretation and subsequent answers to the survey questions, additional revisions were made to address some ambiguous wording or other identified problems with the survey. For more than a month, I made a draft of the survey available to local and state agricultural organizations and professionals (i.e., the Alaska Community Agriculture Association, Alaska Agricultural Statistics Service, DNR, and CES), and I encouraged them to provide comments. After the comment period, I finalized the survey and sent it to UAF's Institutional Review Board (IRB) for approval.

Using Adobe InDesign, the survey was formatted and sized to print on 11 in x 17 in white printer paper, which was then folded in half. A table of crops in question 8 of the survey (see Appendix A) was converted from a Microsoft Word document to a Portable Document Format (PDF) and then incorporated into the survey with the InDesign program. An introductory letter, introducing myself, the project, and the survey was developed using Microsoft Word. The letter was designed to convey the importance of the survey to the producers and was printed on letter size white printer paper and mailed along with the surveys. In an attempt to muster support from the producer community, a similar version of the introduction letter was posted on the Alaska Community Agriculture Association (ACAA) blog site (www.alaskacommunityag.org). Although the ACAA did not formally endorse the

project, a few members expressed their support for the project and encouraged participation on the organization's blog site and in member e-mails. In addition to the survey, two different postcards, an initial card, one similar to the introduction letter that was sent out prior to the mailing of the survey and a follow up reminder post card were created on white cardstock via InDesign. The post cards were printed, four per sheet, on letter size cardstock, and were then cut into individual cards. The next step in the process was to create a mailing list of vegetable and fruit producers in the Tanana Valley.

In order to compile an accurate mailing list for vegetable and fruit producers in the Tanana Valley, I contacted representatives of the Tanana Valley Farmers' Market (TVFM) in Fairbanks, DNR in Fairbanks, SNRAS at UAF, and also sellers at the TVFM, the Highway's End Farmers' Market in Delta Junction, and the Ester Community Market in Ester. Citing agency policy, attempts to receive a list of agricultural producers from the USDA's Agricultural Statistics office in Palmer was unsuccessful. Much of the contact information I was given included all categories of agricultural producers throughout the state and all the different types of sellers at the local markets. I narrowed down the contact lists to only include those producers that were either known or believed to be commercial growers of vegetables and/or fruits in the Tanana Valley. I used this list to mail out the surveys and postcards.

Postcards (Appendix B) were sent out in mid-September to producers. The postcards provided a brief introduction of myself, the project, the importance to growers, and details about when the survey was going to be mailed. Two weeks later, I mailed the survey and included a self-addressed, postage paid manila envelope for the return of the completed survey. For those who wished to complete the survey online, I created an electronic form of the survey through SurveyMonkey.com, a commonly used survey provider, and made it available during the survey period. I included the web address to the online survey in the introduction letter sent to producers. The survey was also posted on the Alaska Community Agriculture Association blog site, and on UAF's SNRAS website.

I requested in the introductory letter (included in both survey delivery methods) that the surveys be completed and returned by November 1, 2010 (to encourage an early response). In the third week of October, I sent out a reminder postcard (Appendix C) re-stating the importance of the survey and requesting a timely response. I began to contact producers starting in early December and asked them if they had received the survey and if they were interested in participating in the survey. For those interested, who did not receive a survey or had misplaced it, I mailed or hand-delivered an additional survey to them. For others who had received the survey but had yet to complete and return it, I completed the survey with them over the phone or in person. The survey mailing date was chosen to occur shortly after the production season to allow growers adequate time to fill out the survey, yet while memories of the season's activities were still vivid.



Strawberries, marigolds, squash, and other crops in a hoophouse at the Fairbanks Experiment Farm.

PHOTO BY DR. GLENN JUDAY, SNRAS PROFESSOR OF FOREST ECOLOGY.

Use of incentives such as prizes has been found to increase mail survey response rates by an average of nine percent (Church 1993). To encourage survey completion, I offered respondents a chance to win one of three different prizes of beef: A 20lb, 15lb, or 10lb package of beef—grown at the University of Alaska Matanuska Experiment Farm in Palmer. Information about prizes was included on the introductory letter and the two postcards. The survey formally closed in late January and I began to compile the data from the surveys into a Microsoft Excel spreadsheet. Using Microsoft Excel, I performed simple statistical analysis to include the sum, mean, median, and mode, of various data. For much of the compiled data, I constructed tables and figures also using an Excel spreadsheet. The analyzed data, tables, and figures are utilized in the results section of the project.

Results

Ultimately, a list of 57 vegetable and fruit producers for the Tanana Valley was identified to include contact information (i.e., phone number, mailing address, and e-mail address). Initially, 57 vegetable and fruit producers who had previously sold commercially in the Tanana Valley were identified. Surveys for two of the identified producers could not be delivered because of incomplete contact information. Three of the producers

who were mailed surveys were later discovered to either not currently grow vegetables and fruits or are now involved in growing other agricultural products such as hay and livestock. Twenty of the 52 successfully identified growers in the Tanana Valley returned completed surveys, with four returning online surveys, for a 38.5% response rate. However, one respondent reported having no production in vegetables and fruits during the 2010 season. The survey is provided in Appendix A.

Demographic Information of Respondents

One way to better understand the current population of vegetable and fruit producers in the Tanana Valley is through age and gender information. While the survey only requested the age and gender of the respondent, many respondents also reported their spouse or partner's age and gender. This indicates, as might be expected that the owners/producers in the Tanana Valley are oftentimes comprised of couples or partners. The ages of the spouses or partners, reported by the respondents, were similar to their own age.

“Please indicate your age”

The average reported age of the respondents is 57³. The median and mode ages are 55 and 54, respectively. Four producers

3. Average refers to mean unless otherwise noted.

(21.1% of respondents) reported ages greater than 70 years old, whereas no respondents reported ages under 30 years old. A few of the oldest respondents mentioned they no longer possess the energy to produce crops as they once did. Presumably, the oldest of the current producers will eventually stop growing crops altogether and if this is taken into consideration, the average age of the current Tanana Valley producers would decrease. For example, if Tanana Valley producers, 70+ years of age, were to retire in the next year and be removed from the pool of current producers, the average age of producers would be 53. Based on the respondents of the survey, there is a clear indication that the current vegetable and fruit producers in the Tanana Valley are predominately composed of an aging population. The findings also point to the Tanana Valley having few younger growers.

“Please indicate your gender”

The respondents are comprised of 11 males, or 57.9% of respondents and 8 females, or 42.1% of the respondents. Although only one respondent’s age and gender (the individual who filled out the survey) is represented for each survey, it was apparent by the comments on many surveys that a partner or spouse was involved in filling out the survey.

History of local vegetable and fruit production in Tanana Valley

“What year did you begin commercially selling produce in the Tanana Valley?”

Although this survey seeks to understand the current production of vegetables and fruits in the Tanana Valley, understanding the history of local production of these crops may indicate the strength and ability of the Tanana Valley to expand the production of locally grown foods for local consumption. Close to 60% of respondents reported growing vegetables and/or fruits in the Tanana Valley for less than ten years. Despite the older demographic of producers, the majority of respondents do

not have an extensive history of local vegetable and fruit production. The average number of years that producers reported growing crops in the Tanana Valley is 13.8, with the median and mode of 8 years. The average is skewed by four producers who have been growing produce for more than 25 years; two reported growing produce for more than 40 years in the Tanana Valley. Therefore, the median of 8 years may be more representative of the typical number of years that crops have been grown in the Tanana Valley.

The Marketing Season

“How many weeks is your selling season (average for last 5 years)?”

The northern location of the Tanana Valley constrains the growing and marketing for local small-scale producers. Those respondents with greater investments in labor and infrastructure (i.e., greenhouses, mechanized farm equipment, and cold storage), reported their selling season to be greater than four months, while other producers with less infrastructure and/or effort expended in crop production reported their selling season to be as little as seven weeks. The average number of selling weeks during 2010 was 13 weeks, with a median and mode of 12 weeks (Table 1). Many producers reporting extending their growing season and hence, selling season, by investing in and utilizing greenhouses, high tunnels, cold storage, and other season extending infrastructure. The average selling season for the CSA producers (42.1% of the survey respondents), who in general have invested in season-extending infrastructure, is 18 weeks.

Acres in Production

“How many acres did you have in production of vegetables and fruits in 2010 (to the nearest 1/10 acre)?”

One measure of current production capacity is the acreage that is devoted to vegetable and fruit production in the Tanana Valley. The reported number of acres for 2010 in production per operation

Table 1. Reported number of selling weeks

How Many Weeks Is Your Selling Season?	
	14
	12
	0
	18
	8
	18
	7
	18
	8
	22
	13
	12
	12
	15
	12
	8
	12
	22
	18
Average	13
Median	12
Mode	12

varies from less than one tenth of an acre up to about 15 acres. The average reported acreage in production of vegetables and fruits is 2.91 acres. This average is skewed by a couple of farms that reported to have more than ten acres in vegetable and fruit production (see Figure 1). If the two farms with acreage in excess of ten acres were removed from acreage consideration, the average acreage in vegetable and fruit crop production for 2010 would be reduced to 1.66 acres. This lower figure provides a clearer picture of a typical operation here in the Alaskan interior. Although eight (42.1%) respondents reported growing on three or more acres, the other 11 (57.9%), reported growing on less. Furthermore, eight (42.1%) of the respondents also

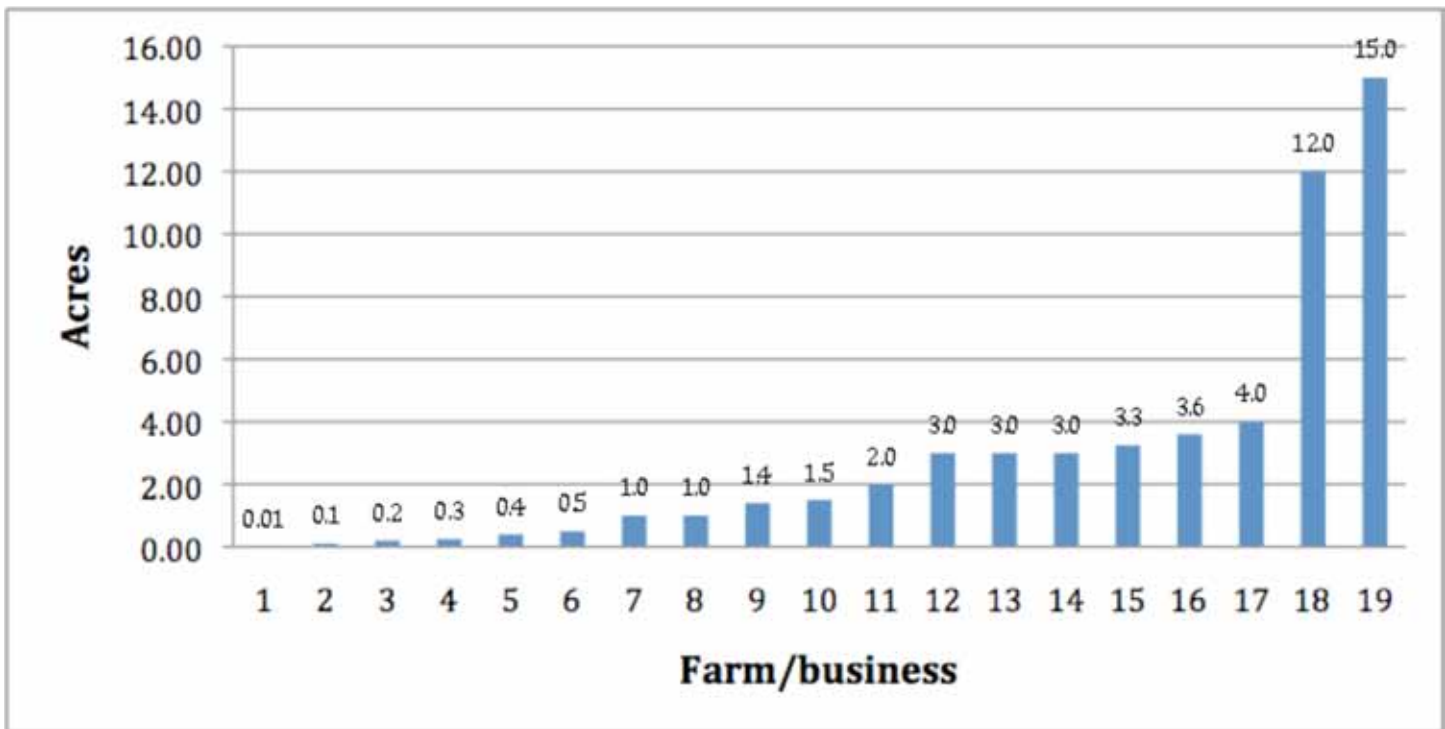


Figure 1. Vegetable and fruit production (acres per farm) in the Tanana Valley (2010)

reported having one acre or less in production of vegetables and fruits during 2010.

“Of the area you had in production of vegetables and fruits in 2010, how much (to the nearest 1/10 acre) are in an enclosed environment (e.g., greenhouse or hoop house)?”

Of the area in production of vegetables and fruits in 2010, the producers reported only having an average of .11 acres in an enclosed environment (e.g., greenhouse or hoop house). While a couple of respondents (10.5%) gave no answer to this question, only two of the respondents reported having no production of vegetables and fruits in an enclosed environment during 2010. Therefore, the survey results indicate that a typical vegetable and fruit producing farm in the Tanana Valley currently grows produce in an enclosed environment, but the area of enclosed environments within which crops are produced is relatively small. This is true regardless of the size of the farm.

Labor

Raising crops is challenging regardless of where it is done. The unique challenges of high-latitude interior Alaska make it even more challenging for those who wish to support their family and communities’ locally grown food needs. Understanding how much labor is involved with growing crops in the Tanana Valley in an important consideration when assessing the current production of produce, and provides insight into what labor requirements may be needed to expand production of vegetable and fruit crops.

“Number of employees or volunteers (including self if applicable)”

Growing vegetables and fruits is labor intensive, but some Tanana Valley growers produce and sell their crops with little or no assistance from others. However, most producers in the Tanana Valley rely on other forms of labor to grow, harvest, market, and sell their produce each season. When the respondents were asked to list how many employees or volunteers worked on their farm/business during the 2010 season, they were given several options including: paid full time, year

round; paid full time, seasonal; paid part time, seasonal; unpaid full time, seasonal; unpaid part time, seasonal; and other. Of the choices given to respondents, paid and unpaid part time seasonal employees comprise the two largest proportions of employee types. During 2010, 45 of 117 (38.5%) reported employees were paid part time seasonal employees and 26 of 117 (22.2%) of employees were unpaid part time seasonal. A few respondents who are also CSA producers reported that some community members work on their farms to reduce the cost of their CSA shares. As might be expected, the farms with the greater area in production of vegetables and fruits reported having the greatest number of employees. With that said, two farms of similar size (three acres in production) reported vastly different numbers of employees. One respondent reported having two employees while the other reported having 13. While several respondents reported having only 1-3 employees (including owner/operator) working at their farms/business during 2010, the overall average number of employees reported by 18 of 19 respondents is 6.2.

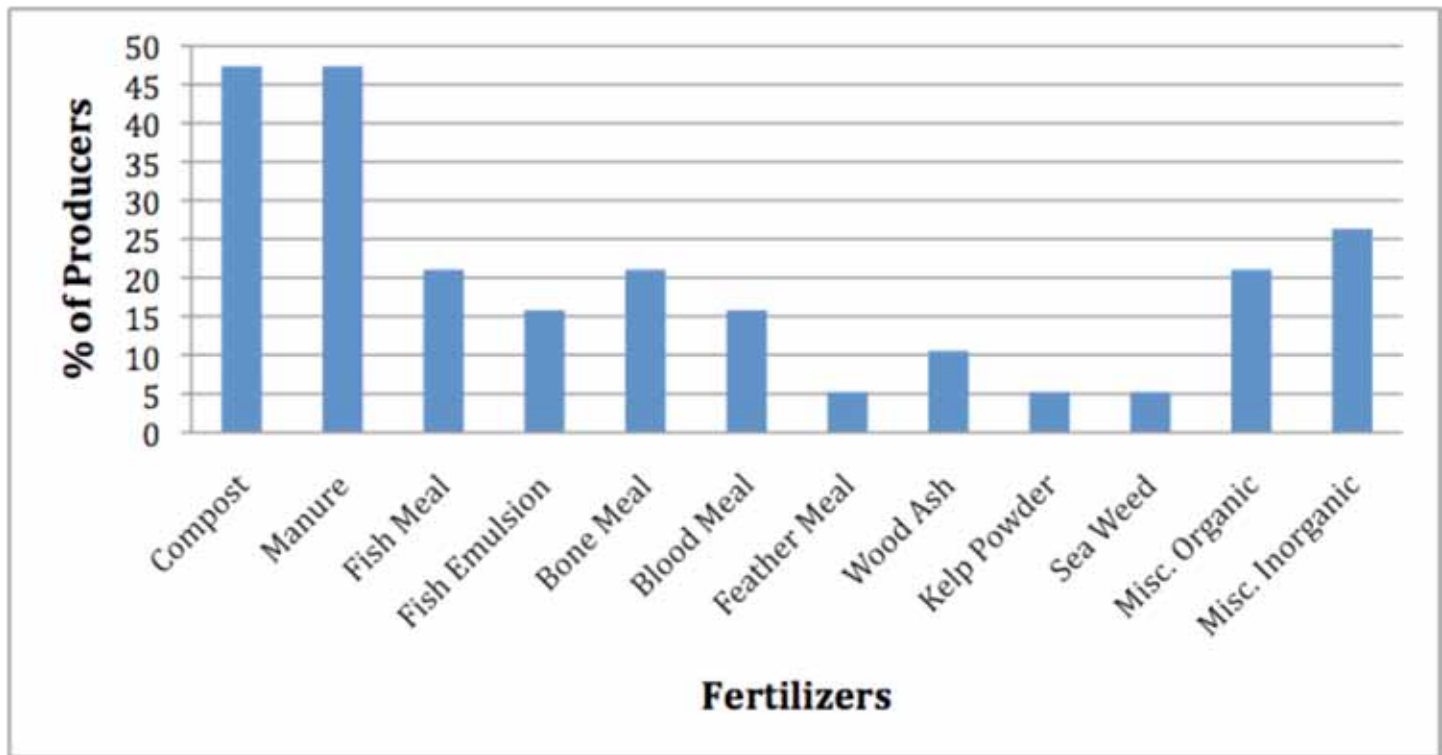


Figure 2. Kinds of fertilizer use in the Tanana Valley (2010)

Fertilizer Use and Farm Type

When the survey was being developed, many Tanana Valley producers indicated that it was important to include questions that addressed the issue of fertilizers used in crop production, the most significant pests that growers must contend with, and how to best manage the most significant insect and pest problems. Whether due to customer preference for organic vs. inorganic produce, or as a function of costs associated with pest management, the answers to these questions can have a great impact on the local production of vegetables and fruits in the Tanana Valley.

“What kinds of fertilizers do you use (both organic and inorganic)?”

A variety of fertilizers, both organic and inorganic, was reported to be used. Figure 2 provides a list of reported fertilizers (and the percentage of producers who reported its use). Various types of inorganic and organic fertilizers were listed by respondents. The most common miscellaneous inorganic fertilizer used and reported by respondents was an 8-32-16 (% of Nitrogen-Phosphorus-Potassium or NPK)

granule fertilizer, one commonly used as a “starter fertilizer.” Other miscellaneous inorganic fertilizers reported include 10-32-16, 20-20-20, calcium nitrate (CaN), and magnesium sulphate (MgS). The most common organic fertilizers reported include compost (e.g., crop residue), animal manures, (i.e., cattle, sheep, horse, chicken, goat, pig, and rabbit), fish meal, bone meal, and blood meal. Miscellaneous organic fertilizers reported by producers include green sand, a mined form of potassium, sulphate of potash, a mined form of potassium, and K Mag, a fertilizer containing 22% potassium, 11% magnesium and 22% sulfur organic components.

“What is your most significant pest problem?”

The most significant pest problems reported are presented in Table 2. Figure 3 represents the frequency each pest was mentioned by the respondents. Respondents provided a range of ways they manage for these pest problems that include the use of fences for moose and rabbits, rotating crops and floating row covers to ward off root maggot, using trap lines, shooting rabbits and voles, etc. See Table 3 for complete list of respondents’

Table 2. Most significant pest problems

Pests:
Aphids
Cut Worms
Flea Beetle
Grey Mold Fungus
Moose
Potato Scab
Rabbits
Root Maggots
Voiles
Weeds

answers to manage for their most significant pest problems.

“Which of the following describes your growing practices?”

Consumers are showing an increased interest in knowing what methods are used to grow the foods they feed their families, and therefore this question was designed to determine how Tanana Valley producers grow their crops (Food Processing

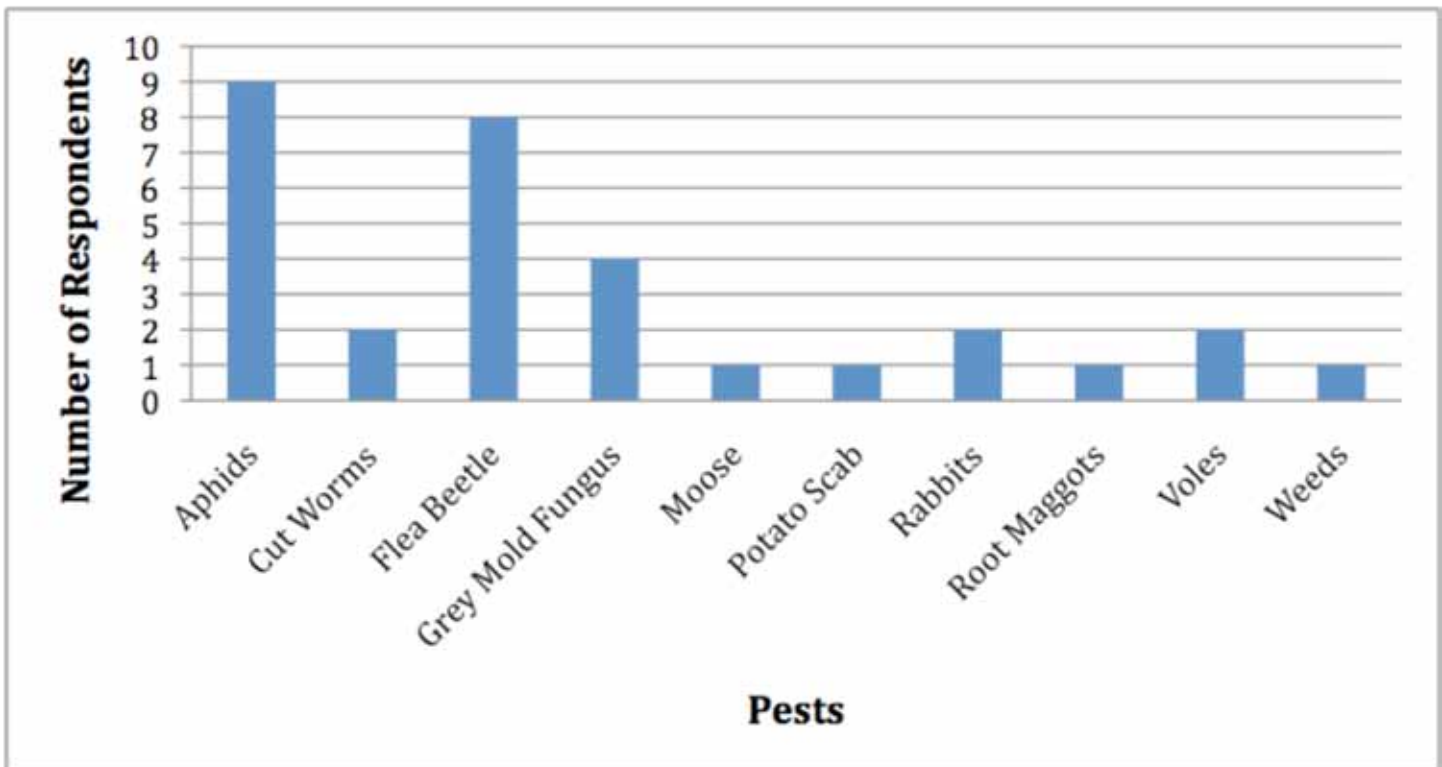


Figure 3. Frequency of reported pest problems

Table 3. Methods of managing for most significant pest problem

How Do You Manage For Your Most Significant Pest Problem?
No longer grow turnips and radishes for sale.
Ashes, so far. Will experiment with nematodes. Planned rotation cycle. Constantly weeding by hand.
Potato rotation and root worm herbicide.
Crop rotation and row covers/root maggot. Electric fence/moose.
Diatomaceous earth.
Lady bugs, wash plants off, hot pepper spray, smash aphids.
Moose- fence, trap line - killed at least 50 voles, shoot rabbits.
Electric fence for moose, lady bugs and wasps for greenhouse.
Aphids- natural insects - washing; moose - fence maintenance.
Root maggot- crop rotation, row covers; voles- mouse traps, cat.
Plant more.
Fence.
Delay planting radishes, turnips until 2nd week of July (End of root maggot cycle).
Orange construction fencing, blood meal.
Ventilation and heat.
Hand-pick them.
Fence, cover things for grubs with floating row covers.
The problem is almost non-existent. So far we have not had to manage for it. We are mostly pest free - with a very small amount of flea beetle.

Center 2001). Thirteen (68.4%) respondents reported that their growing practices are non-certified organic. Non-certified organic refers to reduced input growing practices that use organic fertilizers and methods, but that are not USDA certified. About 1/4 or 26.3% of respondents reported their growing practices as being not organic (high input) and one respondent reported their growing practices as being certified organic (reduced input). During the development of the survey, many producers discussed their operations as being non-certified organic—citing the high cost and effort associated with obtaining and maintaining the USDA certified organic label as a barrier. The absence of many pests commonly found in more southern latitudes has resulted in most producers in the Tanana Valley being successfully able to grow vegetable and fruit crops without utilizing non-organic, or high-input growing practices.

Selling and Marketing Outlets

“Where did you sell your produce in 2010?”

This question queried respondents about the commercial outlets utilized. Respondents were asked to indicate the percentage of their sales made through different outlets such as farmer’s markets, roadside stands, direct from farm/business, CSA subscription, large retailers/supermarkets, small retailers/local markets, restaurants or other trade within and outside the Tanana Valley. This question was designed to better understand where Tanana Valley vegetable and fruit producers sell their produce. If a large portion of locally grown produce is being sold outside the Tanana Valley, it would have an impact on the local food system.

The principal commercial outlets that respondents identified for the 2010 season are farmers’ markets (i.e., TVFM or Ester Community Market), CSA subscriptions, and direct sales from their farms/businesses. Growers also reported selling their produce to small retailers/local markets and that this is an important outlet for their produce. Sales to restaurants or other trade outlets were also identified as important

marketing outlets by five (26.3%) respondents. Respondents identified roadside stands and large retailers/supermarkets to be the outlets where overall, they sold the least. Three (15.8%) respondents reported selling a significant portion of their produce outside the Tanana Valley. With the exception of one respondent, all growers reported selling or otherwise distributing within the Tanana Valley, 76-100% of their 2010 crops. An important note is that growers in the Tanana Valley mainly sell directly to the consumer. Having no wholesale option or “middleman” to market and sell their produce, growers spend a considerable amount of resources (i.e., time and money) finding their own commercial outlets.

Crop Production

“What vegetables and fruits did you grow for commercial sale (excluding personal use) in 2010?”

As might be expected for the interior climate of Alaska, crop production in the Tanana Valley during 2010 focused on green, leafy vegetables and cole crops (see Table 3) The crops that were reported to be grown by at least 75% of the respondents included broccoli, potatoes, and cucumbers. Chard/Swiss chard, leaf lettuce (salad mix), other greens (spinach, collards, mustard, etc), cabbage, cauliflower, kohlrabi, carrots, other root crops (radish, beets, rutabaga, etc.), beans, peas, rhubarb, summer squash (e.g., zucchini, crook neck), tomatoes, and winter squash

Table 4. Crops grown in the Tanana Valley (2010)

Crop	
Asian greens	Cucumbers
Chard/Swiss Chard	Onions, leeks, scallions
Herbs (basil, parsley, etc.)	Peas
Kale	Peppers
Head Lettuce	Rhubarb
Leaf lettuce (Salad mix)	Summer squash (e.g., zucchini, crook neck)
Other greens (Spinach, collards, mustard, etc.)	Strawberries
Broccoli	Other berries (e.g., raspberries and currants)
Cabbage	Tomatoes
Cauliflower	Winter squash and pumpkins
Kohlrabi	Sweet corn
Other (brussels sprouts, savoy cabbage, etc.)	Wild mushrooms
Carrots	Mixed produce (bagged)
Potatoes	Parsnips
Turnips	Tomatillos
Other root crops (radish, beets, rutabaga, etc.)	Eggplant
Beans	Garlic
Celery	Apples

and pumpkins were reported grown by 50-75% of respondents. The percentage of the remaining crops reported grown in 2010 is less than 50% and variably represented among the producers. Table 4 lists the crops that were reported grown in the Tanana Valley during 2010.

In terms of overall production by individual producer, a few respondents have seemingly found a niche, as they have reported growing large quantities of one or two crops such as carrots and potatoes. The sum of reported crops in excess of 1,000 lbs include chard/Swiss chard, kale, head lettuce, leaf lettuce (salad mix), other greens (spinach, collards, mustard, etc.), broccoli, cabbage, cauliflower, kohlrabi, carrots, potatoes, turnips, other root crops (radish, beets, rutabaga, etc.), beans, cucumbers, onions/leeks/scallions, peas, summer squash (e.g., zucchini, crook neck), tomatoes, winter squash and pumpkins, and brussels sprouts and savoy cabbage, for example.

While many respondents listed or estimated weights of crops grown in 2010, many others simply chose not to report their information or were unable to report these data. Several respondents mentioned, either in person or in their survey responses, that it is difficult to provide weights of individual crops and that they often use “bunches,” heads, counts, stalks, and other units of measure besides weight for various crops. Whether from the difficulty in weighing individual crops, related to a lack of labor or infrastructure, or due to a lack of interest in doing so, many producers noted that they do not keep track of how much, in terms of weight, that they sell. Due to the apparent difficulty in obtaining weights of certain crops for many of the producers, the reported estimated weights of individual crops are considered to be rough approximations.

An additional approach to quantifying vegetable and fruit production was presented in another question. Growers were asked to provide the percentage of total sales accounted for by individual crops. Unfortunately, the results from this question were sporadic and unreliable. When totaled by respondent, most of the responses did not equal 100% of sales. A

few of the producers were able to estimate percentage of sales for select crops, but did not list values for most others. The respondents in general appear to have difficulty determining their percentage of sales for each crop they grew in 2010 or they simply chose not to report the values.

Constraints on Expanding Farm/business

“If applicable, which are the constraints on expanding your farm/business that are most significant to you?” and “What do you believe are the most important constraints on expanding the production of locally grown vegetables and fruits in the Tanana Valley?”

Besides the climatic and seasonal weather challenges of growing food in the northern latitudes, there are economic, political, and social challenges that may constrain the production capability and capacity for growers to expand production. The overall top five reported constraints includes “I do not wish to expand my farm/business,” “access to capital,” “crop storage availability,” “on-farm infrastructure availability (e.g., hoop houses, greenhouses, low tunnels, chillers),” and “labor costs.” Other significant constraints reported by many include those imposed by “fuel costs,” “transportation/shipping costs,” and “electricity costs.” Table 5 lists the ten most common constraints reported by growers. See Appendix A for a complete list of constraints (Question 9) presented to respondents. Respondents reported many important constraints on expanding the production of locally grown produce in the Tanana Valley. Table 6 summarizes those constraints reported by the producers. When visiting with and informally interviewing a few of the producers during the development of the survey, a lack of farm infrastructure in the form of cold storage, the high costs of labor, and access to capital were reoccurring constraints mentioned.

Table 5. Constraints on expanding farm/business

Constraints
I do not wish to expand my farm/business
Crop storage availability
Labor costs
On-farm infrastructure availability (e.g., hoop houses, greenhouses, low tunnels, chillers)
Access to capital/financing terms
Water availability
Fuel costs
Transportation/shipping costs
Electricity costs
Land availability

Table 6. Constraints on expanding production in the Tanana Valley

Constraints
Affordable land
Local processing facilities
Unreliable market and affordable market outlets to sell produce
Outside competition selling organic produce in Tanana Valley
Availability of labor and labor costs
Production costs
Lack of farmers who want to work hard
Climate/length of growing season
Crop storage
Marketing
Financing for infrastructure development

Gross Sales

“What are your estimated vegetable and fruit gross sales for 2010?”

One informative measure of production is the market value of crops sold. Respondents were queried as to their 2010 estimated gross sales, with responses to this question provided by 78.9% of growers. Of those that reported their estimated gross sales for 2010, 15.8% of respondents reported earning less than \$1,000, while 36.8% reported earning \$1,000-\$10,000 in gross sales. The remaining 26.3% of growers reported earnings greater than \$10,000. Overall, the farms with the greatest investment in farm infrastructure (i.e., chillers, hoop houses, greenhouses, low tunnels, farm tractors, and other equipment), acreage in production, or those who found a niche crop and market, reported the highest gross sales. With that said, however, at least one respondent, who reported only having about one acre in production, also reported higher than average gross sales for 2010. While respondents gave several reasons to justify a certain level of gross sales, the few who identified themselves to be “hobby farmers,” on average, reported the least acreage in production and lowest gross sales. Essentially, the reported gross sales reflect the diversity of vegetable and fruit production in the Tanana Valley.

Farm Revenues

“Were your gross farm revenues in 2010 higher or lower than 2009?”

In a separate question, respondents were asked whether their 2010 revenues exceeded those of 2009. This question was designed to help determine whether or not Tanana Valley growers are expanding their production of vegetable and fruits from one year to the next. Respondents were then asked to give reasons for their response that would provide some insight as to why revenues were higher or lower than the previous year. Although five (26.3%) respondents reported lower gross farm revenues in 2010 than 2009, for reasons ranging from poor weather and fuel

costs to no sales for the season, 11 (57.9%) respondents reported higher gross farm revenues in 2010 than the previous year. Reasons respondents gave for an increase in gross farm revenue in 2010 include an increase in the number of CSA shares/members, continuous improvement in farming methods and marketing, “raised prices and good harvest,” “new markets,” “more customers from Fairbanks,” and simply “more sales.” Finally, three (15.8%) respondents reported having the same gross farm revenue in 2010 as in 2009. One respondent cited using the “same model as previous year for vegetable sales,” selling the same number of CSA shares at the same price, and overall having the same “level of sales.”

Farm Expenditures

“Were your farm expenditures in 2010 higher or lower than 2009?”

A subsequent question focused on whether the farm expenditures for producers in 2010 were greater than those of the previous year. The majority of respondents (73.7%) reported their farm expenditures in 2010 to be higher than in 2009. Costs associated with electricity, fuel, infrastructure, supplies, labor, farm expansion, new equipment, and growing more produce for more markets were all listed by respondents as reasons for the higher farm expenditures in 2010. The five (26.3%) respondents who reported lower farm expenditures in 2010 than in 2009

Table 7. Anticipated major changes in respondent’s farm/business over next five years

Major Changes:
None
New labor
Purchase better equipment
Type of containers to grow things in
Grow flowers, exports to China (potatoes)
Find affordable insurance - restart farming
Finding a stable way to market our produce
Plan to phase out of commercial hay production
Increase greenhouse space and field development
If Coop opens soon, wholesale more - direct sales less
Develop infrastructure, but force on raising our own food
Increase CSA members to 20 shares, garden expansion by 20%
Add greenhouse/hoop house. Increase peonies and small fruits
Field expansion, more hoop-houses, green houses, initiation of CSA
We will move away from veggies and move to more starts and peonies
We are moving to Hawaii this winter so we can grow veggies year round
Seed production- possibly more school, garden production - more focus on sales, outlets other than CSA
We expect to reduce production. We may expand squash and pumpkin production and grow less other items for sale
Increase in number of CSA shares. We have finally grown to the point where we can hire/pay a part time employee next year

reported limiting spending, exerting less effort, producing at a smaller scale, and investing less in farm equipment and supplies as reasons for having lower expenses than the previous year.

Off-farm Income

“What percentage of your household income comes from off-farm employment?”

One way to better understand the level of economic return from farming is to determine the proportion of outside income that is needed to maintain the producers’ desired lifestyle. The vast majority of respondents (84.2%) reported that most of their household income comes from off-farm employment. However, eight (42.1%) respondents reported that 25-49% of their household income does not come from off-farm employment. Many of these respondents had three or more acres in crop production during 2010 and reported their gross sales to equal at least \$10,000. Although a few of the other respondents (who reported up to 49% of their income not coming from off-farm employment) reported areas in production during 2010 of less than one acre and gross sales of \$5,000 or less, it appears that the more area in production and the greater the gross sales, the less producers rely on off-farm employment.

Expanded Production and Major Changes

“Over the past 5 years, has your farm/business expanded production?”, “Do you expect to expand your farm/business over the next 5 years?”, and “What major changes do you anticipate in your farm/business over the next five years?”

Growers were asked to report whether they had expanded their farming operations in the past five years, expected to expand in the next five years, and also what major changes they anticipated occurring in their farms in the next five years. Over the past five years, 14 (73.7%) respondents reported expanding production of their farm/business, although only ten (52.6%) respondents expect to expand their farm/business over the next five years. Table 7 lists the major changes respondents anticipate occurring in their farm/business over the next five years.

USDA Alaska Acreage & Production Survey

“Do you participate in the USDA’s Spring and Fall Alaska Acreage & Production survey?”

In an attempt to determine the proportion of Tanana Valley growers’ production data that are captured by the USDA’s Alaska Office of Agricultural Statistics Service, respondents were asked if they participate in the USDA’s Spring and Fall Alaska Acreage & Production survey. As the name implies, the survey is used to estimate the seasonal acreage and production of agricultural lands in the state. Sixty-three point two percent



Cauliflower at Wild Rose Farm.

PHOTO COURTESY WILD ROSE FARM

of respondents reported participating in the USDA’s survey, whereas 15.8% reported not participating in the survey, and 21.1% reported not knowing what the survey is.

Discussion

This project is designed as a pilot study of the current production of vegetables and fruits grown in the Tanana Valley. While the broader goal of the project was to determine how much produce and fruit is being grown in the Tanana Valley for local consumption, the development of a survey instrument that can be implemented annually to measure Tanana Valley production of locally grown vegetables and fruits became the focus. Promising attributes of the survey results, challenges of the study, and survey questions to be addressed for future studies have all resulted from this project.

The results highlight many successes of the production of vegetables and fruits in the Tanana Valley. The vast variety of crops that were reported grown in 2010 profile the capability and resourcefulness of individuals under challenging climatic circumstances. Producers have successfully grown numerous crops and extended their growing season, and ultimately their selling season through innovation and hard work. In general, the producers in the Tanana Valley have seen an increase in

revenues from the previous year. Producers reported greater sales and greater interest from area residents in purchasing their vegetables and fruits. Many of the growers reported the desire to expand their farms in the coming year, which would serve to fill the growing demand for locally produced foods. Most CSA producers have also reported expansion in both their farms and CSA shares.

Although the level of production for each farm and CSA producer varies (i.e., 13-40 shares per acre), the potential to feed an increasing number of people on the existing farms in the Tanana Valley appears possible. Based on CSA producers' farm size and the number of CSA shares they reported during the development of the survey, on a per acre basis, currently there is a potential for producers to supply approximately 40 subscriptions per acre of land in production. A CSA share in the Tanana Valley, assuming it provides a portion of vegetables and fruits to an average of four people during the selling season, has the potential to provide vegetables and fruits to 160 people per acre of land in production. What this calculation does not take into consideration is that the CSA producers are also selling a portion of their production through other outlets such as farmers' markets and roadside stands.

Regardless of the outlet or market, producers in the Tanana Valley have the potential to feed a significant number of people—more than the current number of households that take advantage of locally grown vegetables and fruits. For example, using the mean farm size (calculated from the survey results) in the Tanana Valley of 2.91 acres, and multiplying it by 54, the number of identified farms in the Tanana Valley during 2010 (identified during the development of the project) should result in 157.14 acres of production. Assuming that each farm is capable of growing enough to feed 160 people per acre (based on 40 CSA shares per acre and 4 people per share), the producers in the Tanana Valley could supply locally grown vegetables and fruits to 25,142 people. A study of fresh market vegetable farms in the upper Midwest with similar results found that farms that operate a CSA were able to provide 25-35 shares per acre (Hendrickson 2005). Another study of CSA producers, also in the upper Midwest, found that growers were able to provide as many as 27.8 shares per acre (Tegtmeier and Duffy 2005). In the Tanana Valley, 25 shares per acre would provide food for 15,714 people. As a reminder, CSA producers do not generally sell all of their vegetables and fruits as shares, therefore, the remaining food would significantly increase these previous estimates. Also, it is important to note this survey does not capture the production of non-commercial growers, those who grow crops in home, community, and school gardens throughout the Tanana Valley. While the possibility of increasing the production of vegetables and fruits in the Tanana Valley is great, there are many challenges in using a survey instrument to measure

“[S]ome producers made it clear that they either did not have or use a computer, or do not have access to the internet.”

current and future production levels.

The first challenge I faced when developing the project was to create an accurate and inclusive list of current producers in the Tanana Valley. While a few organizations were willing to openly share their producer contact lists, others were not. The list of producers I created was as accurate as it could be without being able to cross reference them with the databases of other organizations (i.e., local, federal, and non-governmental organizations). To minimize the possibility of missing an important segment of the grower population in the Tanana Valley, it would therefore be prudent for organizations and agencies alike to work together on an annually maintained grower contact list that can be used for future surveys and studies.

Another challenge of the project was receiving a robust response rate. The response rate for this project of 38.5% was similar to other vegetable producer studies (Hendrickson 2005 and Tegtmeier and Duffy 2005).

Both studies had a 38% useable response rate after one month of implementation. However, the response rate for this study was the result of many hours, weeks, and months of followup and reminders—making it closer to three months of data collection instead of one. Approximately 50% of this survey's responses were a result of multiple phone, e-mail, and mailer reminders, as well as in-person and over the phone interviews, and extra, hand delivered copies of the survey. The effort involved in receiving a similar or higher response rate on an annual basis would likely be unwieldy and impractical. What needs to be developed is a standardized system for measuring production that is consistent with grower practices. Developing a method to achieve greater producer buy-in of the survey would also facilitate increased survey responses. If producers believe that participating in an annual survey is going to benefit them and their community, perhaps they would more readily participate in such an ongoing study. With that said, it may not succeed at encouraging all groups of producers to participate, regardless of how attractive a survey may appear on paper. For example, only two of 18 surveys mailed to the Delta Junction area were returned. Cultural differences between many of these producers and others in the Tanana Valley may have contributed to the low response rate for this area. These growers represent a substantial number of producers in the area, and without their participation accurate estimates of production are and will likely be impaired in future surveys. Strong online survey responses are also a challenge. For a small sample size (52 farms), online survey responses only account for 20% of the completed and returned surveys, and just 7.69% of the total number of surveys initially delivered. While the responses of online surveys were significant for the overall number of returned surveys, the costs associated with creating and maintaining future online surveys should be taken into consideration if such low response rates result. While

developing the survey, some producers made it clear that they either did not have or use a computer, or do not have access to the internet. Perhaps, in general, Tanana Valley growers are not the appropriate audience for the use of internet surveys. If mixed-mode surveys are used in the future for this region, mail surveys in combination with telephone or in-person interviews may be more appropriate than online survey instruments. An additional challenge of the survey and project was in obtaining adequate and accurate reported measurements of harvested vegetables and fruits from growers.

In designing the survey, I considered various possible ways that production could be quantified. At issue was that weight was an appropriate measure for certain crops, but not for others. As previously discussed, most respondents did not or were unable to report the weights of the various crops they harvested for commercial sale. Producers use many units of measure when tracking their own production. Many producers in the Tanana Valley simply do not track their production or keep detailed records of the quantity of crops they harvest. Some CSA producers in the Tanana Valley sell weekly shares of freshly harvested produce at roadside stands or other pick-up locations. They either select and weigh out a certain number of crops and distribute to each shareholder, direct shareholders to select a certain number of each crop from boxes—which may or may not be pre-weighed, bundled, or found singly in a particular box—or a grower will use a combination of the two methods in distributing weekly shares. Therefore, using weight as the unit of measure to determine production levels seems inadequate or at the very least, incomplete. Measuring the current production of vegetables and fruits in the Tanana Valley may require a more complex measuring system that incorporates multiple units of measure (i.e., bunches, heads, counts, stalks) and one which is more consistent with producer practices. Perhaps the question is whether it must be a weight based measurement or would it be appropriate and meaningful to include other measurements?

One challenge of measuring vegetable and fruit production in the Tanana Valley that this project did not pursue was that of measuring the contribution of vegetables and fruits grown by community and home gardeners. During the development of the survey, local publicity surrounding the project resulted in e-mails from home gardeners who were concerned about being excluded from the survey. It is understood that home gardeners and community gardens contribute greatly to the production of vegetables and fruits in the Tanana Valley, but measuring that production was beyond the scope of this project. Furthermore, based on our experience with commercial growers, obtaining accurate and complete measurements would be a challenge in and of itself. Therefore, I only targeted growers who sold commercially so that I would have a way to track increased production over time through gross sales.

“[A] few of the survey questions have raised additional questions that may be beneficial to include in future studies.”

Besides the question of how to measure production, whether it be by weight or other means, a few of the survey questions have raised additional questions that may be beneficial to include in future studies. One question asked, “What year did you begin commercially selling produce in the Tanana Valley?” A follow up question may have been useful. Querying producers as to “How many years they had lived in the Tanana Valley,” for example, would have provided insight into the relationship between the length of time a grower has resided in the Tanana Valley and when they began commercial production. Since the average reported age of growers in the Tanana Valley is 57 and close to 60% of the respondents reported growing produce in the Tanana Valley for less than ten years, this additional question would provide an important understanding of when producers start growing commercially and also provide information on the recruitment age of Tanana Valley growers. To illustrate, if the recruitment age in the Tanana Valley is determined

to be 50 years old or older, some community members may be inclined to develop ways to recruit locals into farming at a younger age or attempt to bring in younger growers to the area. An interesting and perhaps useful second, open-ended question might be to ask, “For what reason(s) did you become a commercial producer of vegetables and fruits in the Tanana Valley?” Responses to these additional questions might reveal further trends in producer recruitment to the Tanana Valley or uncover other information that could be used to improve the local food system.

An additional question with regard to enclosed environments could have been used to uncover how growers use their enclosed environments. Specifically it would have been interesting to ask producers for what purposes they utilize enclosed environments. Understanding what growers specifically use their greenhouses and other enclosed environments for might underscore the importance of enclosed environments to growers and better explain how the growing and selling season is extended in the Tanana Valley.

Another question that could be included in future surveys is, “What is your most significant pest problem?” The responses to this survey of the most significant reported pests could be used to inform that question (see Table 2). Respondents would be asked to rank the different pest problems identified here on a scale of one to five, identifying their significance as a pest problem. A similar ranking structure might be helpful in addressing a similar issue with two of the other survey questions.

Yet another question asked, “If applicable, which are the constraints on expanding your farm/business that are most significant to you? Please choose from the list below ... and rank them in order of importance (1 being most important, then 2, 3, etc.)” Respondents were given 20 different constraints to choose from and some respondents chose to rank all of them. The intention of the question was for respondents to identify

and rank up to approximately five questions, but this was not made explicit so as to not constrain respondents' number of selections. However, it appears that asking respondents explicitly to choose up to five constraints and rank them may have been more appropriate. The other question asked, "What do you believe are the most important constraints on expanding the production of locally grown vegetables and fruits in the Tanana Valley (please list)?" In replacement of "please list" in the question, a table of constraints identified by Tanana Valley producers in 2010 (see Table 6) could be used in future surveys and respondents could also be asked to identify and rank a given number of constraints on a scale of one to five. Future researchers employing surveys of vegetable and fruit producers in the Tanana Valley and elsewhere in Alaska may find it useful to incorporate the findings of this study, including the above mentioned additions and changes to the survey.

Conclusion

Through innovation, creativity, and hard work, Tanana Valley producers are successfully growing a remarkable variety of crops and expanding overall production—all under challenging circumstances. Producers have also been successful at extending the selling season through the use of important season extension techniques. The potential to expand production and to feed more families in the Tanana Valley is great, but continued research is needed on enclosed environments and other season extending methods to support longer growing seasons in the Tanana Valley and elsewhere. Furthermore, with an aging producer population, more young farmers may need to be attracted to the Tanana Valley. Current marketing outlets are cost-, time-, and labor-intensive. A central marketing outlet like a cooperative market currently being proposed in Fairbanks or other ways of decreasing the transaction costs between producers and consumers could serve as an important outlet for growers. Measuring the production of vegetables and fruits in the Tanana Valley is another challenge that will require further research and a greater collaborative effort among growers and researchers. Greater grower participation is essential to develop a system to accurately measure production. If producers wish to have current and potential consumers informed about the benefits of buying locally grown vegetables and fruits, a better understanding of local production is needed.

While this study was successful at highlighting many promising aspects of local vegetable and fruit production in the Tanana Valley, it has also shed some light on a few of the many challenges Alaska faces if it is to transition from a linear food system to a more complete food system that generates value to local communities. A word of caution is advisable before implementing this survey statewide, as many of the constraints and challenges identified in this pilot study likely apply to other areas of Alaska. Hopefully, however, this study can provide a platform for future studies in the production of vegetables and fruits in the Tanana Valley and beyond.

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Hydroponically grown lettuce at Johnson's Family Farm in Fairbanks.

PHOTO BY NANCY TARNAI, UAF SCHOOL OF NATURAL RESOURCES & AGRICULTURAL SCIENCES

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Appendix A

Introductory Letter and Producer Survey

Vegetable and Fruit Producer Survey for the Tanana Valley

Hello. My name is Charles Caster and I am an undergraduate student with the School of Natural Resources and Agricultural Sciences (SNRAS) at the University of Alaska Fairbanks (UAF). The school seeks to improve the understanding of how much of the food that Alaskans consume is produced in our state. As part of this effort, I have put together this survey for vegetable and fruit growers in the Tanana Valley region who produce for our community. I am working in collaboration with Drs. Joshua Greenberg, Craig Gerlach, Peter Fix, and Dean Carol Lewis at UAF and with producers in the farm and agricultural community. We intend to extend this survey in the future to food producers across the state. We are interested in providing relevant and useful information that producers need to promote a robust local food system.

This survey is intended to complement the U.S. Department of Agricultural survey for Alaska producers. With your help and support, we can provide a more accurate estimate of current production and producer needs. Better information may strengthen our local food system for the benefit of our environment, the community and your customers. This survey is completely voluntary and confidential (all personally identifiable information withheld). When complete, results of the study will be available at the main SNRAS website, www.uaf.edu/snras/. I sincerely thank you for your time and consideration.

For your convenience, there is an online version of the survey available at www.surveymonkey.com/s/agproducersurvey.

If you have any questions about this survey please contact me, Charles Caster at 907-455-3890, e-mail: cdcaster@alaska.edu or my advisor, Dr. Joshua Greenberg at 907-474-7189, e-mail: j.greenberg@alaska.edu.

For filling out and sending back the following survey, your name will be entered in a drawing for three prizes (a 20-pound, a 15-pound, and a 10-pound package) of Alaska-grown beef raised at our own Matanuska Experiment Farm.

Vegetable and Fruit Production in the Tanana Valley

Important Questions for Agricultural Producers in the Tanana Valley



**Please complete this survey and return to
UAF School of Natural Resources & Agricultural Sciences**

All Responses Are Confidential
Thank You for Your Time and Cooperation
Postage-Paid Return Envelope Provided

A Study Conducted by



UAF SNRAS
PO Box 757200
Fairbanks, Alaska 99775-6080



This survey has been reviewed by the UAF Institutional Review Board.

Please fill out and select all that apply. Approximate when necessary.

Name: _____

Name of farm (if applicable): _____

Address/location of farm: _____

1. What year did you begin commercially selling produce in the Tanana Valley?

2. How many weeks is your selling season (average for last 5 years)? _____ weeks

3. Number of employees or volunteers (including self if applicable):

Paid full time, year round _____ Paid full time, seasonal _____

Unpaid full time, seasonal _____ Paid part time, seasonal _____

Unpaid part time, seasonal _____

Other (please specify) _____

4. a. How many acres did you have in production of vegetables and fruits in 2010 (to the

nearest 1/10 acre*)? _____ acres

*1/10 acre equals 66 ft on a side (4,356 ft²)

b. Of the area you had in production of vegetables and fruits in 2010, how much (to the nearest 1/10 acre) is in an enclosed environment (e.g., greenhouse or hoop house)?

_____ acres

This survey has been reviewed by the UAF Institutional Review Board.

5. Please briefly answer the following questions about your farming practices.

a. What kinds of fertilizers do you use (both organic and inorganic)?

b. What is your most significant pest problem?

c. How do you manage for your most significant pest problem?

d. Which of the following describes your growing practices:

Non-certified organic ____ Certified organic ____ Not organic ____

6. Where did you sell your produce in 2010? Please indicate the percentage of your sales that occurred through each of the following outlets within and outside the Tanana Valley.

Outlets	% within Tanana Valley	% outside Tanana Valley (in Alaska)
Farmers' markets		
Roadside stands		
Direct sales from your farm/business		
Community supported agriculture subscription (CSA)		
Large retailers/supermarkets		
Small retailers/local markets		
Restaurants or other trade		
Other (please specify)		

7. How much of what you produced in 2010 was sold or otherwise distributed within the Tanana Valley?

- a. ____ < 25 %
- b. ____ 25 – 50 %
- c. ____ 51 – 75 %
- d. ____ 76 – 100 %

This survey has been reviewed by the UAF Institutional Review Board.

8. What vegetables and fruits did you grow for commercial sale (excluding personal use) in 2010? For each crop grown, list weight and its percentage of your total sales revenue (approximate when necessary).

Crop	This year, 2010	
	Weight (lbs)	% of Sales
Leafy greens		
Asian greens		
Chard/Swiss chard		
Herbs (basil, parsley, etc.)		
Kale		
Head lettuce		
Leaf lettuce (salad mix)		
Sprouts		
Other greens (spinach, collards, mustard greens, etc.)		
Cole crops		
Broccoli		
Cabbage		
Cauliflower		
Kohlrabi		
Other (brussels sprouts, savoy cabbage, etc.)		
Root crops		
Carrots		
Potatoes		
Turnips		
Other root crops (radish, beets, rutabaga, etc.)		

Crop	This year, 2010	
	Weight (lbs)	% of Sales
Other		
Beans		
Celery		
Cucumbers		
Onions, leeks, scallions		
Peas		
Peppers		
Rhubarb		
Summer squash (e.g., zucchini, crook neck)		
Strawberries		
Other berries (raspberries, currants, etc.)		
Tomatoes		
Winter squash and pumpkins		
Others (please list)		

This survey has been reviewed by the UAF Institutional Review Board.

9. If applicable, which are the constraints on expanding your farm/business that are most significant to you? Please choose from the list below those that apply to you and rank them in order of importance (1 being most important, then 2, 3, etc.)?

- I do not wish to expand my farm/business
- Access to capital/financing terms
- Labor availability (pool of qualified and willing workers)
- Land availability
- Water availability
- Crop storage availability
- Equipment sales and service availability
- Farm supplies availability (e.g., seed, organic and inorganic fertilizers)
- On-farm infrastructure availability (e.g., hoop houses, greenhouses, low tunnels, chillers)
- Off-farm infrastructure availability (e.g., commercial processors)
- Fuel costs
- Transportation/shipping costs
- Electricity costs
- Labor costs
- Available market outlets
- Lack of demand for existing product line
- Lack of production knowledge for new crops or expansion of existing product line
- Insufficient university and Cooperative Extension Service research and outreach
- Government policy & regulation (e.g., zoning, taxes)
- Other (please specify) _____

This survey has been reviewed by the UAF Institutional Review Board.

10. What do you believe are the most important constraints on expanding the production of locally grown vegetables and fruits in the Tanana Valley (please list)?

11. What are your estimated vegetable and fruit gross sales for 2010?

I am requesting this to determine current production levels and economies of scale for the industry. Please recall that strict confidentiality of all responses is assured.

\$ _____

12. What percentage of your household income comes from off farm employment (choose one of the following categories)?

a. ____ 0 %

b. ____ 1 – 25 %

c. ____ 26 – 50 %

d. ____ 51 – 75 %

e. ____ 76 – 100 %

13. Were your gross farm revenues in 2010 higher or lower than 2009?

____ Higher ____ Lower

Please give reasons for changes in revenue. _____

14. Were your farm expenditures in 2010 higher or lower than 2009?

____ Higher ____ Lower

Please give reasons for changes in expenses. _____

This survey has been reviewed by the UAF Institutional Review Board.

15. Over the past 5 years, has your farm/business expanded production?

Yes No

16. Do you expect to expand your farm/business over the next 5 years?

Yes No

17. What major changes do you anticipate in your farm/business over the next 5 years?

18. Do you participate in the USDA's Spring and Fall Alaska Acreage & Production survey?

Yes No I don't know what this is

The following two questions will help us better understand the demographic makeup of the local farming community. Please indicate your age and gender below.

Age: Gender: Male Female

Comments welcome (feel free to use the additional comments page included with this survey)

Thank you very much for your time and responses. Please return your completed questionnaire in the enclosed self-addressed stamped envelope as soon as possible.

Please don't hesitate to contact me with questions or comments, Charles Caster at 907-455-3890, e-mail: cdcaster@alaska.edu or my advisor, Dr. Joshua Greenberg at 907-474-7189, e-mail: j.greenberg@alaska.edu.

This survey has been reviewed by the UAF Institutional Review Board.

Appendix B

Front and Back of Post Card Mailer Sent to Producers Prior to Start of Survey Period

Upcoming Vegetable & Fruit Survey for the Tanana Valley

Dear Food Producer,

I am an undergraduate student with the **School of Natural Resources and Agricultural Sciences** at the **University of Alaska Fairbanks**. To learn how much of the food that Alaskans consume is produced in our state, we are surveying agricultural producers. As part of this effort, I will be sending out a **survey for vegetable and fruit growers** in the Tanana Valley region who produce for our community. We are interested in providing relevant and useful information that producers need to promote a robust local food system. **For filling out and sending back the survey, your name will be entered in a drawing for three prizes** (a 20-pound, a 15-pound, and a 10-pound package) of Alaska-grown beef raised at our own Matanuska Experiment Farm. Surveys will be sent out the beginning of **October** with the request that they be completed and returned by **November 1st, 2010**. An online version will also be made available.

For any questions, please contact me at **455-3890** or at cdcaster@alaska.edu.

I sincerely thank you for your time and consideration.

Charles Caster

SNRAS, UAF
PO Box 767200
Fairbanks, AK 99775-7200

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Appendix C

Front and Back of Post Card Mailer Sent to Producers Three Weeks after Start of Survey Period

Vegetable & Fruit Producer Survey

Dear Tanana Valley resident,

A survey was recently mailed to you regarding your commercial production of vegetables and fruits. If you have already returned the survey, thank you for your help. If not, please complete the survey and return it at your earliest convenience. Since only about 60 producers in the Tanana Valley were mailed surveys, it is extremely important that your answers are included in the results.

If you did not received the survey, or it was misplaced, please contact me at **(907) 455-3890**, or e-mail me at **cdcaster@alaska.edu**.

Sincerely,

Charles Caster
Undergraduate student
Dept. of Resources Management
University of Alaska Fairbanks

SNRAS, UAF
PO Box 757200
Fairbanks, AK 99775-7200





About the Agricultural and Forestry Experiment Station

The federal Hatch Act of 1887 authorized establishment of agricultural experiment stations in the U.S. and its territories to provide science-based research information to farmers. There are agricultural experiment stations in each of the 50 states, Puerto Rico, and Guam. All but one are part of the land-grant college system. The Morrill Act established the land-grant colleges in 1862. While the experiment stations perform agricultural research, the land-grant colleges provide education in the science and economics of agriculture.

The Alaska Agricultural Experiment Station was established in Sitka in 1898, also the site of the first experiment farm in Alaska. Subsequent stations were opened at Kodiak, Kenai, Rampart, Copper Center, Fairbanks, and Matanuska. The latter two remain. The Alaska station was not originally part of the Alaska land-grant college system. The Alaska Agricultural College and School of Mines was established by the Morrill Act in 1922. It became the University of Alaska in 1935. The Fairbanks and Matanuska farms are part the Agricultural and Forestry Experiment Station of the University of Alaska Fairbanks, which also includes the Palmer Research Center.

Early experiment station researchers developed adapted cultivars of grains, grasses, potatoes, and berries, and introduced many vegetable cultivars appropriate to Alaska. Animal and poultry management was also important. This work continues, as does research in soils and revegetation, forest ecology and management, and rural and economic development. Change has been constant as the Agricultural and Forestry Experiment Station continues to bring state-of-the-art research information to its clientele.

Agricultural and Forestry Experiment Station

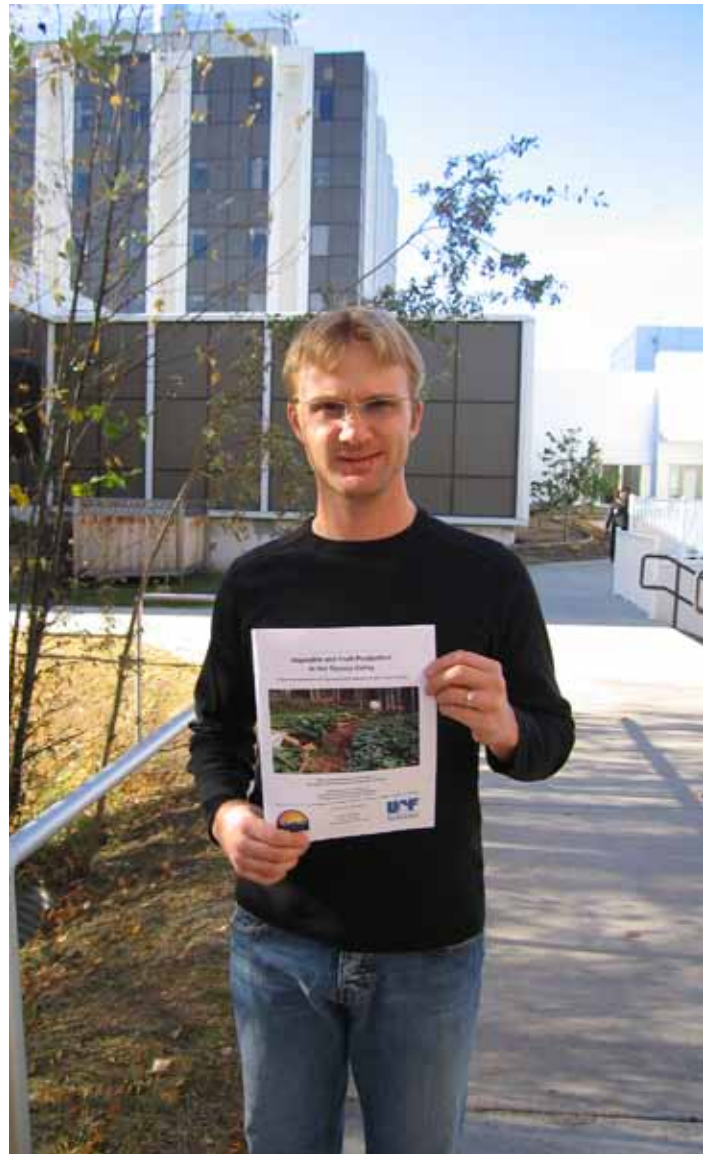
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Charles Caster holding a copy of the final survey on West Ridge, near the School of Natural Resources & Agricultural Sciences, September 2010.

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