Cryogenic Spinach: Freezing, Thawing, and Growing in the Winter

Biographical Information:

Taunya Ernst
Utah State University

Taunya Ernst received a bachelors' degree in biology, with a minor in chemistry before being converted to the joy of plant production, and is now working on her masters' degree in Plant Science at Utah State University.

Session Description:

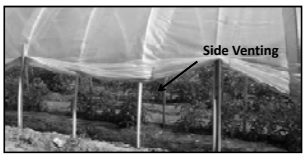
This session will be an overview of high tunnel construction and production, with an emphasis on the potential for high tunnel winter spinach production. Early economic data for high tunnel winter spinach production will also be presented.

"Cryogenic Spinach:
Freezing, Thawing, and Growing in the Winter"

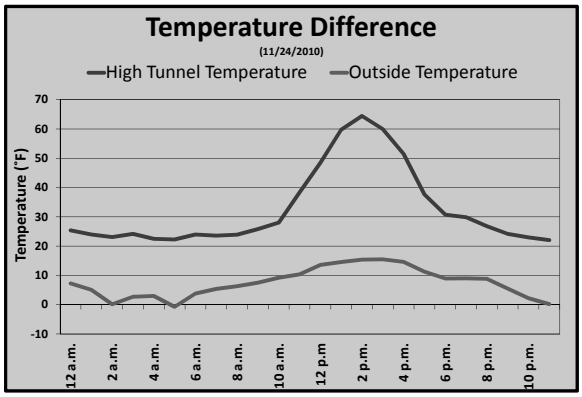
Taunya Ernst
MS Student
Utah State University
Department Plant Soils and Climate

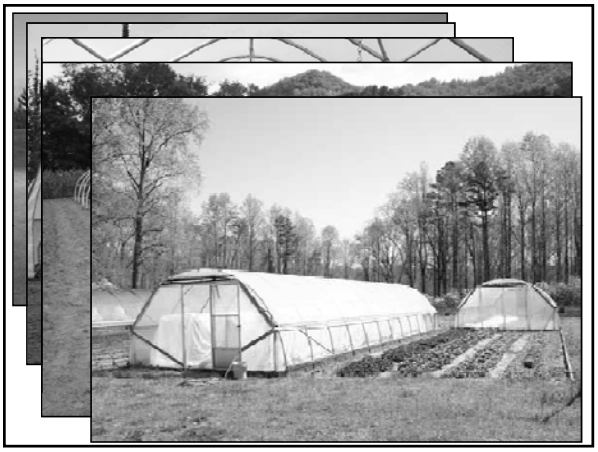
High Tunnels

- Low cost way to manipulate temperatures
- Raise temperatures though solar radiation
- Temperatures lowed through manual venting
- Successfully used for season extension



High Tunnel Temperature



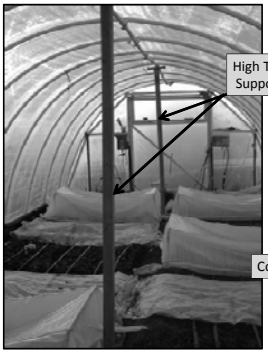


Winter Considerations

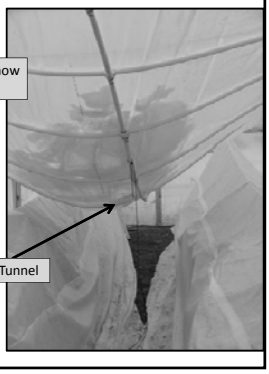
Water Supply

Rodents (voles)

Winter Considerations

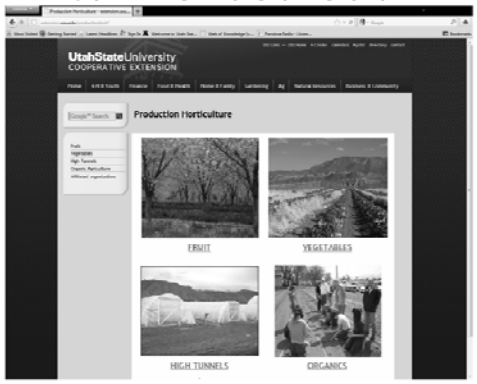


High Tunnel Snow Support

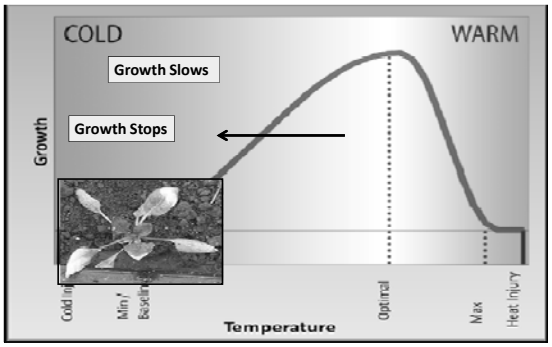


Collapsed Tunnel

tunnel.usu.edu



GROWTH RESPONSE TO TEMPERATURE



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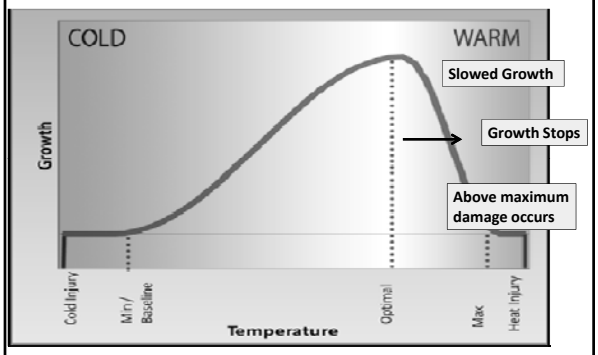
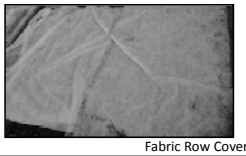


Summer Adaptations

Winter Adaptations

Secondary Covers and Heating Cables

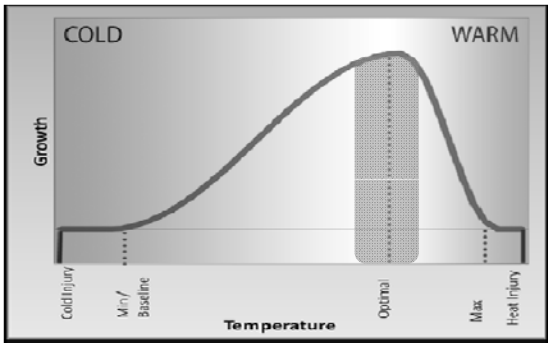
Low Tunnel



Fabric Row Cover

- Raise temperature an additional 4 to 5 degrees above high tunnel temperature
- Stay warmer at night
- Temperatures rise quicker with sun rise
- Heating cables maintain soil temperatures above freezing

Growth temperatures for spinach (°F)

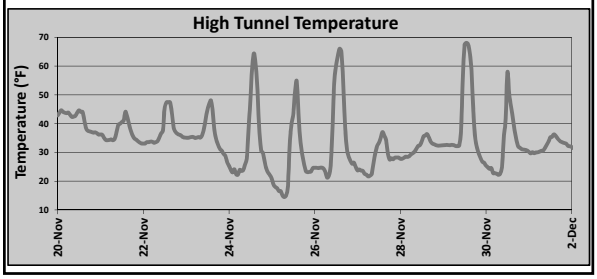


Minimum	Optimal	Optimum range	Maximum
36	67	64-70	84

Limits to Winter Production

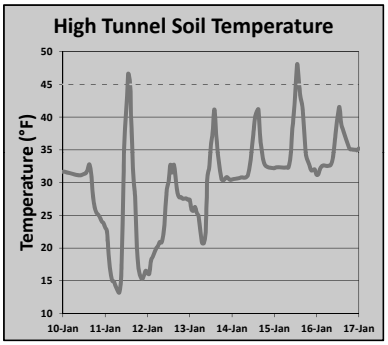
- Hourly temperature fluctuations
- Extreme diurnal temperature changes

- Slow or stop growth
- Damage to photosynthesis systems



Cooler Soil Conditions

- Inhibits root growth
- Slows nutrient uptake from the soil
- Restricts water uptake causing wilting



Light Levels

- Shorter day lengths
- Low sun angles
- Light reduced by high tunnels
- Further reduced by secondary covers
- Decreases spinach quality

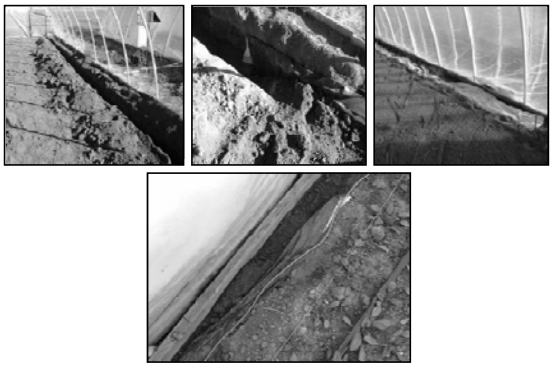
Plant Production

Transplants

- 4 to 5 weeks before transplanting
- Harden 1 to 2 days before transplanting

- Greenhouse:
  - 72°F day temperature
  - 65°F night temperature

Installation of Foam Board



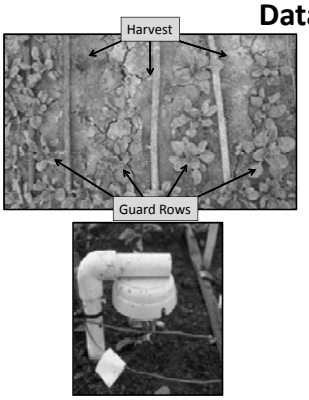
Soil Heating Cables

- Heating Cables were submerged ≈1 inch below soil surface
- Cable were spaced every 12 inches
- Each plant was within 6 inches of a cable
- Warmed only when soil temperatures were below 65˚F

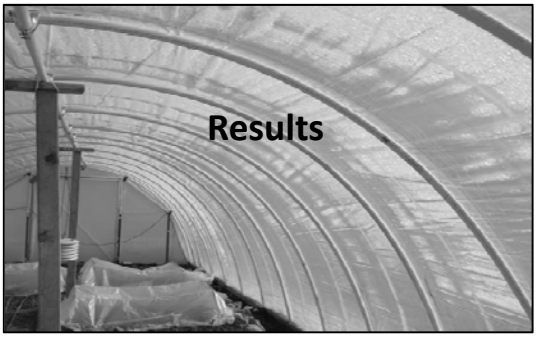
High Tunnel Layout

- Heating cables installed in half the tunnel
- Planted with greenhouse grown transplants
- Secondary covers were placed over top

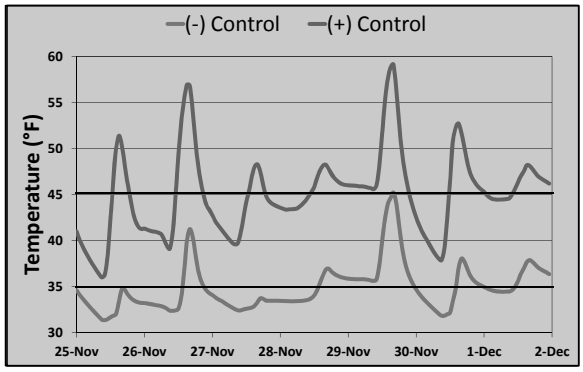
Data Collection



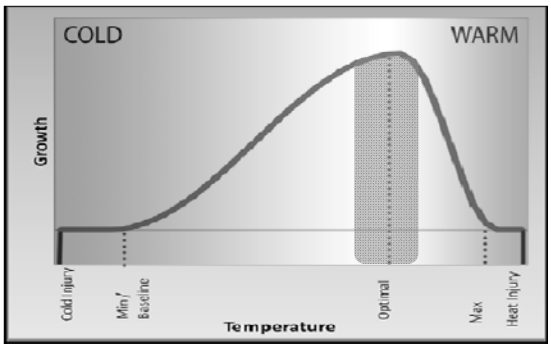
- Six harvests, every ten days.
- Each plant: weight, leaf area, and number of leaves was recorded.
- Soil and air temperatures recorded.



Soil Temperature



Growth temperatures for spinach (°F)



Minimum	Optimal	Optimum range	Maximum
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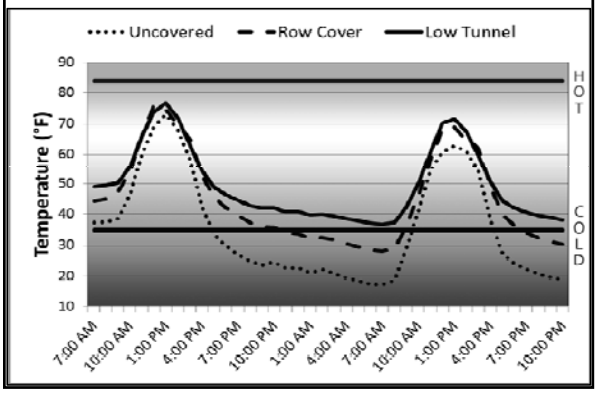
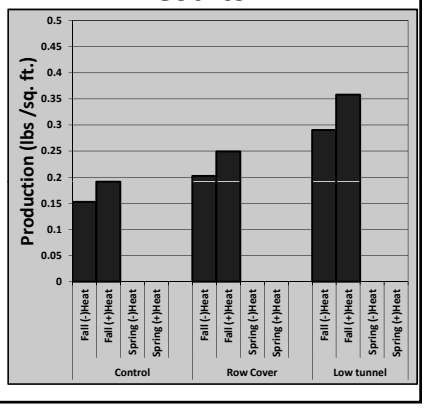
Air Temperature with Soil Heating Cables



Results

FALL

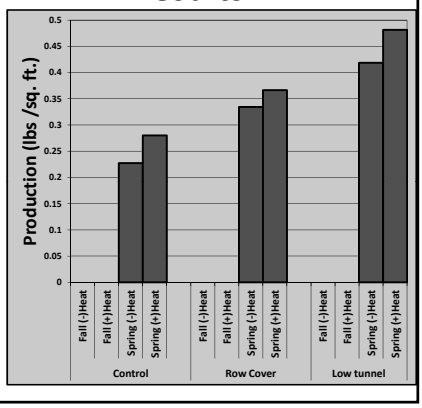
- Heating increased yield by 30%.
- Low tunnels showed a yield increase of 54 and 58%.
- Row cover showed a yield increase of 27 and 30%.



Results

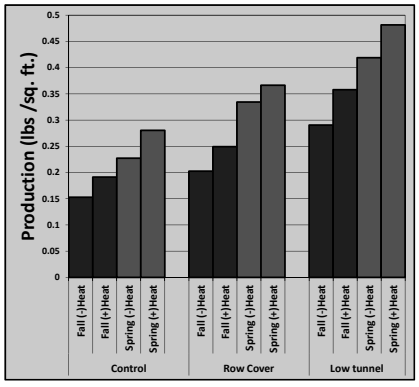
SPRING

- Soil heating had no effect on yield.
- Cover treatment effect similar to fall.

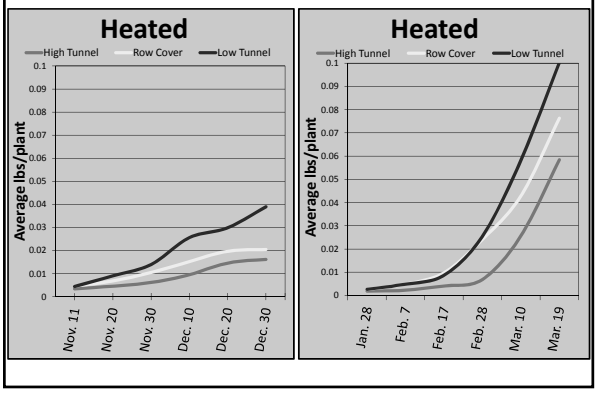


Results

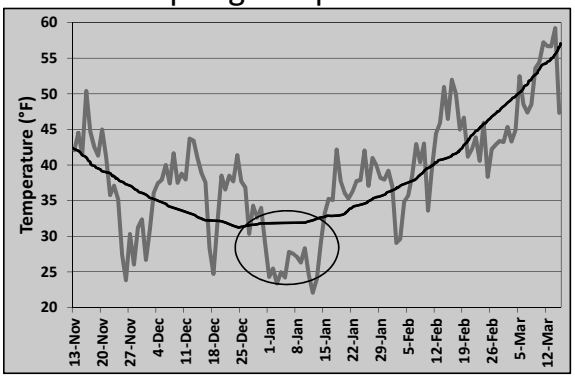
Spring achieved higher yields



FALL SPRING



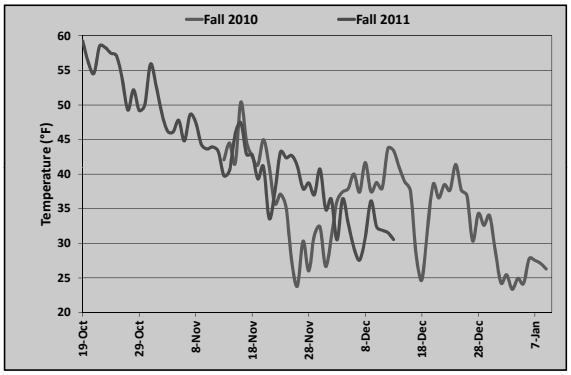
Fall and Spring Temperature Trends



Fall 2011 - Repeated Trial

- Planted 3 weeks earlier
- Experienced warmer temperatures
- Higher yields
- Heat cables had no effect
- Secondary cover effect reduced

Compare Fall Temperatures



14’ by 96’ High Tunnel

Units	Quanity			Total	
	Transplant	Direct Seed	Price	Transplant	Direct seed
lbs	111.3	324	$2.49	$277.14	$806.76
10oz bags	178	518	$1.99	$354.22	$1,030.82
Total Labor				$630.00	$450.00
Total Supplies				$268.50	$102.50
Annual Operating				$898.50	$552.50
~~Annual Deprec (Hi/lo tunnels)~~				~~$250.00~~	~~$250.00~~
~~Annual Deprec (irrigation)~~				~~$60.00~~	~~$60.00~~
Total Expenses				$1,208.50	$862.50
Net Income		lbs		-$931.36	-$55.74
		10oz		-$854.28	$168.32

Extra Costs with Transplants

LABOR	Hours	Cost	
soil test + application	1.5	10	$15.00
Tillage	1	10	$10.00
Planting	5	10	$50.00
Tunnel Set-up	2	10	$20.00
Irrigation etc.	2	10	$20.00
Transplant Care	15	10	$150.00
Harvest	35	10	$350.00
Cleanout	1.5	10	$15.00
			$630.00

SUPPLIES	units	No.Units	Price	
Soil Test	each	1	14	$14.00
Fuel	gal	1	3	$3.00
Fertilizer	lbs	3	1	$3.00
Drip Tape	ft	1000	0.05	$50.00
Seed	10000	2	7.5	$15.00
Media		1	50	$50.00
Flats	Case 100	1	116	$116.00
Harvest Containers	bags	700	0.025	$17.50
				$268.50

Costs Associated with Direct Seeding

LABOR	Hours	Cost	
soil test + application	1.5	10	$15.00
Tillage	1	10	$10.00
Planting	2	10	$20.00
Tunnel Set-up	2	10	$20.00
Irrigation etc.	2	10	$20.00
Harvest	35	10	$350.00
Cleanout	1.5	10	$15.00
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Seed	10000	2	7.5	$15.00
Harvest Containers	bags	700	0.025	$17.50
				$102.50

Conclusions:

- Soil heating cables increased soil temperatures in the fall but had little effect in spring.
- Heating cables increased fall production levels.
- Low tunnels and row covers raise temperatures above the base line.
- Internal covers increase production levels.
- Spring production has higher production levels compared to fall.
- Early fall and spring production require venting.

NEXT STEPS:

- **Further economic data compilation**

Comparing Productivity of Direct Seeded and Transplanted Spinach in High Tunnels

Biographical Information:

Dr. Dan Drost
Utah State University

Dan Drost grew up on a small diversified farm in western Michigan. He graduated from Michigan State University with a master's degree in Horticulture with an emphasis on vegetable production and physiology. He earned his PhD from Cornell University in Vegetable Crops. Prior to arriving in Utah, he taught horticulture in New Zealand and has worked for Utah State University since 1992. In addition to his research work with vegetables, Dan is interested in small farm production systems, organic agriculture, the creation of efficient farm systems, and intensive farm and land management.

Session Description:

During the presentation, Dan Drost will outline the concepts behind why direct seeding of spinach may benefit early and late season establishment and total productivity. Spinach production approaches will be described and discussed. As soil cools in the fall, plant stands decrease due to cold conditions. Using row covers and low tunnels can improve plant populations which will result in increased productivity. Second, different harvest strategies are needed to optimize production. We evaluated whole plant clipping and compared that to selective leaf removal. Our finding show that clipping works. We need more work to determine how often to clip to get sufficient production to make the system profitable.

Comparing Productivity of Direct Seeded & Transplanted Spinach in High Tunnels

Heather Larson, USU Undergraduate
and
Dr. Dan Drost, Professor of Horticulture

Western Region Sustainable Agriculture Research and Education

Utah Department of Agriculture and Food

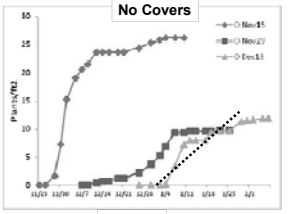
Utah State University COOPERATIVE EXTENSION

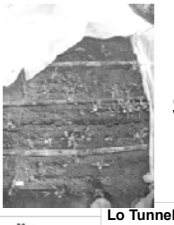
Overview

- Extending the Harvest Season & Techniques
  - Covers
  - Clipping vs. Pruning
- Improving Space Usage & Crop Establishment
  - Transplanting vs. Seeding
- Seasons of Production
  - Fall vs. Spring

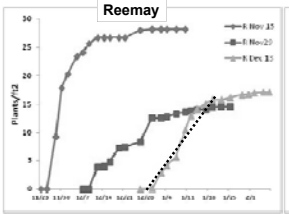
Approaches

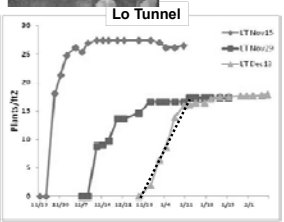
- Fabric covers
- Low tunnels
- 4 week old plants
- Direct seeded
- September to February plantings
- Clipping or pruning



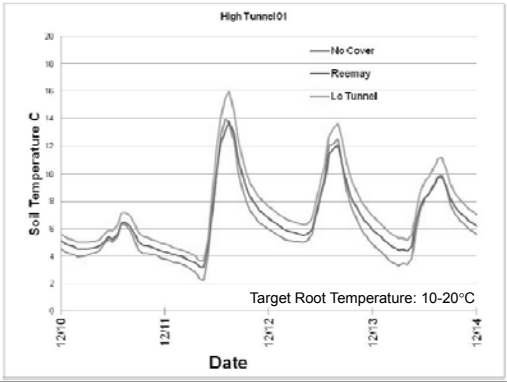


Fall Seeded Spinach





Average Hourly Temperatures



Clipping and Plant Regrowth

Fresh Weight: Clipping vs. Leaf Pruning

Growing Season	Row or Plant Spacing	Transplants + Leaf Removal		Direct Seeded + Leaf Clipping	
		lbs/ft^2	% Mkt	lbs/ft^2	% Mkt
Fall (Nov 1-Dec 22)	2”	0.03	89.0	0.17	54.7
	4”	0.02	85.3	0.15	60.5
	6”	0.01	81.5	0.09	61.3
Winter (Dec 23–Feb 10)	2”	0.06	91.7	0.11	43.2
	4”	0.04	86.1	0.08	59.5
	6”	0.02	77.0	0.05	57.6
Spring (Feb 10-Apr 1)	2”	0.30	76.5	0.45	38.1
	4”	0.11	83.4	0.32	45.6
	6”	0.06	80.1	0.24	49.2

Conclusion

- Reasons to Direct Seed:
  - Low Labor Requirements
  - Fast
  - Low Cost
  - Easy to Adjust Density
- Reasons not to:
  - Emergence Problems
  - Weeds
  - Thinning?
  - Difficult in Wet Soil

Conclusion cont.

- Clipping
  - Low labor costs
  - Timing of re-growth
  - Leaf quality issues
- Leaf Harvest
  - More labor intensive
  - Lower productivity
  - Better quality/consistancy

Thank you!

- Taunya Ernst
- Heather Larson
- Sam Day

Utah State University COOPERATIVE EXTENSION

Utah Department of Agriculture and Food

Success Through Agriculture Diversity

Biographical Information:

Thayne Tagge
Tagge's Famous Fruit

In 1979 Thayne was first introduced to agriculture by selling Bear Lake Raspberries. In 1982 Thayne would go up each morning and pick up 50 cases of raspberries and sell them in Sugarhouse. They originally named their business Berry Nice and would sell berries at stands and farmers' markets. Thayne Tagge went from being a CPA to being a farmer when he purchased his first farm in 1997. It was a 38-acre orchard in Perry, UT. When they bought the orchard they changed their business name to Thayne and Cari Tagge's Famous Fruit. Now they own and farm 68 acres in Perry and Willard and rent another 60 acres for row crops. All of their orchards are on a drip irrigation system. They now sell at farmers' markets and have a CSA that continues to grow. They also produce and sell value added products.

Session Description:

Tagge's Famous Fruit gained success through diversification both in what they produce and how they market it. They also needed to look at what they could do with their product. This session will cover the areas that they feel were important in creating a successful business.

1. Farming
2. Use of technology
3. Diversification
4. Markets and Niches

Realities of Food Businesses

Biographical Information:

Karin Allen

Karin Allen is the food quality & entrepreneurship specialist at Utah State University Extension. Her programs include the development of extension programming to assist small businesses and entrepreneurs with production and processing of quality foods. She also coordinates academic and outreach services of the on-campus Food Innovation Laboratory and Incubator Kitchen. She also helps people meet the labeling requirements to meet State and/or Federal regulations.

Session Description:

While starting any business takes hard work and dedication, the food industry poses many unique barriers to entry. Learn about product safety, shelf life, and regulatory issues that affect your product, as well as terminology, pricing, and marketing options specific to processed foods.

What NRCS Can Offer the Ag Producer

Biographical Information:

Craig McKnight
NRCS

Craig McKnight is the District Conservationist (field office supervisor) for the NRCS Natural Resource Conservation Service. He has been working for NRCS for about 10 years and in Utah for the past 2 years. They help agricultural producers plan and implement conservation practices. Mr. McKnight supervises the Ogden and Coalville offices covering Summit, Morgan, Weber and Davis counties.

Aaron Dalling
NRCS

Aaron Dalling is a resource conservationist with the Ogden NRCS field office. He develops conservation plans with farmers/landowners. He has 7 years of experience, 6.5 of which are in Idaho.

Session Description:

NRCS has technical and financial assistance programs. This session will briefly cover these programs, their eligibility requirements, and some of the benefits of each program. There are different Farm Bill programs for planning, financial incentive payments, and easement protection.

FSA Programs for Beginning Farmers and Ranchers

Biographical Information:

Clif Rasmussen
Farm Loan Officer
USDA Farm Service Agency

Dale Fowers
County Executive Director
USDA Farm Service Agency

Clif Rasmussen is the Farm Loan Officer for Utah Farm Service Agency in Summit/Weber/Morgan and Davis Counties. Dale Fowers is County Executive Director for the same area. Farm Service Agency administers disaster programs, commodity programs, and makes and guarantees loans to eligible farmers and ranchers in Utah.

Session Description:

This session will address programs available to assist beginning farmers and ranchers purchase and operate their own farms and ranches.

Farm Service Agency (FSA)

FSA makes direct and guaranteed farm ownership and operating loans to family-size farmers and ranchers who cannot obtain commercial credit from a bank, Farm Credit System institution, or other lender. FSA loans can be used to purchase land, livestock, equipment, feed, seed, and supplies. Our loans can also be used to construct buildings or make farm improvements.

FSA loans are often provided to beginning farmers who cannot qualify for conventional loans because they have insufficient financial resources. FSA also helps established farmers who have suffered financial setbacks from natural disasters, or whose resources are too limited to maintain profitable farming operations.

Farm Loan Programs

- Direct Loans
  1) Direct Operating Loans
  2) Direct Farm Ownership Loans
  3) Emergency Loans
- Loans for Beginning Farmers
- Loans for Socially Disadvantaged
- Guaranteed Loans
  1) Operating Loans
  2) Farm Ownership Loans
- Rural Youth Loan Program

Maximum Loan Amounts

- Direct Farm Ownership Loan
  1) $300,000
  2) Up to 40 year term
- Direct Farm Operating Loan
  1) $300,000
  2) 1-7 year term
- Guaranteed Farm Ownership and Farm Operating Loans
  1) $1,214,000 (Amount varies annually based on inflation). Same terms as direct loans.

Beginning Farmers and Ranchers

FSA provides loans to beginning farmers and ranchers who are unable to obtain financing from commercial credit sources. Each fiscal year, FSA targets a portion of its direct and guaranteed funds to beginning farmers and ranchers.

Requirements:

- Has not operated a farm or ranch for more than 10 years;
- Meet loan eligibility requirements of program to which he/she is applying;
- Substantially participates in the operation;
- For farm ownership purposes, does not own a farm greater than 30% of the median size farm in the county and must have participated in business operation of a farm for at least 3 years;
- If the applicant is an entity, all members must be related by blood or marriage.

Loans for Socially Disadvantaged Applicants

FSA makes and guarantees loans to approved socially disadvantaged applicants to buy and operate family-size farms and ranches.

A socially disadvantaged (SDA) farmer, rancher, or agricultural producer is one of a group whose members have been subjected to racial, ethnic, or gender prejudice because of his or her identity as a member of the group without regard to his or her individual qualities. SDA groups are women, African Americans, American Indians, Alaskan Natives, Hispanics, Asian Americans and Pacific Islanders.

Direct Farm Operating Loans

Operating Loans may be used to purchase items such as livestock, farm equipment, feed, seed, fuel, farm chemicals, insurance, and other operating expenses. Operating Loans can also be used to pay for minor improvements to buildings, costs associated with land and water development, family subsistence, and to refinance debts under certain conditions.

Loan funds cannot be used to finance nonfarm enterprises, which include raising earthworms, exotic birds, tropical fish, dogs, or horses for non-farm purposes (racing, pleasure or show).

Direct Farm Ownership Loan Program

With a Direct Farm Ownership Loan, you can purchase farmland, construct or repair buildings and other fixtures, and promote soil and water conservation.

Loan applicants may choose to participate in a joint financing plan. In this program, FSA lends up to 50 percent of the amount financed, and another lender provides the balance.

Down Payment Loan Program

FSA's Down Payment loan program assists socially disadvantaged and beginning farmers in purchasing a farm. Retiring farmers may use this program to transfer their land to future generations.

- Applicant must make a cash down payment of at least 5% of the purchase price.
- Maximum loan amount does not exceed 45% of the lesser of (a) the purchase price of the farm or ranch to be acquired; (b) the appraised value of the farm or ranch to be acquired; or (c) $500,000 (This results in a maximum loan amount of $225,000).
- Term of the loan is 20 years. The interest rate is 4% below the direct FO rate, but not lower than 1.5%.
- Remaining balance may be obtained from a commercial lender or private party. FSA can provide up to a 95% guarantee if financing is obtained from a commercial lender. Participating lenders do not have to pay a guarantee fee.
- Financing from participating lenders must have an amortization period of at least 30 years and cannot have a balloon payment due within the first 20 years of the loan.

Joint Financing Arrangement

Beginning farmers may choose to participate in a joint financing arrangement. With this arrangement, FSA lends up to 50% of the amount financed, and another lender provides 50% or more. The interest rates can be obtained from your local FSA office and the term of the loan will not exceed 40 years or the useful life of the security

Down Payment vs. Participation Loan Financing

Mary Farmer applies to purchase a farm for $600,000. She is a beginning farmer and has $30,000 in the bank.

Bank of Farming has agreed to finance up to 50% of the purchase price at 8% with a 30 year amortization.

Mary could do the loan as a participation loan where the Bank will finance $300,000 at 8% for 30 years and FSA will finance $300,000 at 5% for 40 years.

Mary could do a BF Down Payment Loan where she contributes $30,000 as a down payment, the bank finances $345,000 at 8% with a 30 year amortization, and a balloon in 20 years. FSA finances $225,000 for 20 years at 1.5%.

Down Payment vs. Participation Loan Financing

Participation Loan Payment

- Bank $300,000 at 8% for 30 years = $26,649 annual payment
- FSA $300,000 at 5% for 40 years = $17,848 annual payment
- Total payments = $44,497

Mary has $30,000 to use for operating

Down Payment Loan Payment

- Bank $345,000 at 8% for 30 years = $30,646 annual payment
- FSA $225,000 at 1.5% for 20 years = $13,106 annual payment
- Total payments = $43,752

Mary uses $30,000 for down payment

FSA's RURAL YOUTH LOAN PROGRAM

FSA makes operating loans of up to $5,000 to eligible individual rural youths age 10-20 to finance income-producing, agriculture-related projects. Project must be of modest size, educational, and initiated, developed and carried out by rural youths participating in 4-H clubs, FFA or a similar organization.

Project must be an organized and supervised program of work. It must be planned and operated with the assistance of the organization advisor, produce sufficient income to repay the loan, and provide the youth with practical business and educational experience in agriculture-related skills.

Guarantee Loan Program

Guaranteed Operating

- $1,214,000
- Term 1-7 years
- Normal interest rates
- Similar uses as Direct Operating Loan

Guaranteed Farm Ownership

- $1,214,000
- Term up to 40 years
- Normal interest rates
- Similar uses as Direct Farm Ownership Loan

Land Contract Guarantee Program

- Program is a "hybrid" of both the direct and guaranteed program
- Consistent with other FSA regulations with regards to general eligibility criteria and most loan servicing options
- Feasibility and eligibility are documented in the Farm Business Plan similar to a Direct Farm Ownership loan
- Seller is guaranteed payment similar to a lender requesting a Guaranteed Farm Ownership loan

Guarantee Period
- 10 years from the effective date of the guarantee unless terminated earlier

Terms
- Amortized for a minimum of 20 years and payments on the contract must be of equal amounts during guarantee period
- Balloon payments are prohibited during guarantee period

Down Payment
- The buyer must provide a minimum down payment of 5%.

Interest Rate
- Fixed during guarantee period
- Not to exceed DFO rate in effect at the time the guarantee is issued plus 3%
- Rate may be renegotiated after guarantee is terminated

Program Interest Rates Effective February 1, 2012

Farm Operating - Direct
1.375%

Farm Ownership - Direct
3.375%

Farm Ownership - Direct, Joint Financing
5.00%

Farm Ownership - Down Payment
1.5%

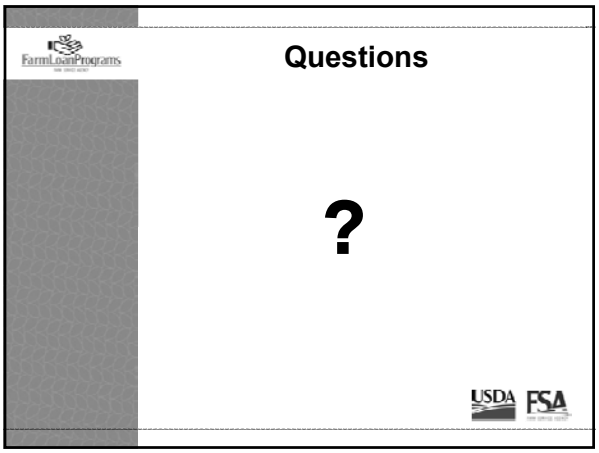
Emergency Loan - Amount of Actual Loss
3.75%

Where to Apply

Applications for direct loan assistance may be submitted to the local FSA office serving the area where the operation is located. Local FSA offices are listed in the telephone directory under U.S. Government, Department of Agriculture or Farm Service Agency.

For guaranteed loans, applicants must apply to a commercial lender who participates in the Guaranteed Loan Program. Contact your local FSA office for a list of participating lenders.

Further information about this and other FSA programs is available from local FSA offices or on the FSA website at: www.fsa.usda.gov.


Farm Loan Programs
Questions
?
USDA FSA

Pepper Nitrogen Needs- Improving Yield and Color Development

Biographical Information:

Samuel Day
Utah State University

Samuel Day grew up on a vegetable and fruit farm in West Layton, Utah. He currently works for Day Farms in Layton, a 230-acre fruit/vegetable farm. They specialize in quality produce picked fresh daily. He also works as a research assistant for Dan Drost at Utah State University, where he will be receiving a degree in Crop Science in May. Additionally, Samuel helps run and manage a produce stand in Layton throughout the summer months.

Session Description:

Peppers are an important part of Day Farms vegetable production operation. However, peppers are difficult to grow, suffer from excessive sunburn to enlarging fruits, produce quite late in the year, and develop color later in the season than desired. Utah State University student Sam Day will discuss how increasing nitrogen nutrition and topical applications of abscisic acid increase productivity and red color development in field grown peppers. This has implications to tunnel pepper production which would create early market opportunities thus leading to increased profitability.

See the following presentation for additional information.

2011 Pepper Trial -Nitrogen and ABA study

USU research conducted at Day Farms- Layton Utah

Samuel Day / Dan Drost

UtahStateUniversity
COOPERATIVE EXTENSION

Bell Pepper -*Capsicum annuum*-

- Majority of roots concentrated within 12-24 inches of the soil surface.
- A flower will open within 3 hrs of sunrise and is typically open for less than 1 day.
- Flower drop as well as decreased pollen formation and viability is a common problem during hot weather.
- When night temperatures are above 90 degrees (F) fruit will not set.
- Plant protection, plastic tunnels, and increased nutrients, can aid in producing a high quality fruit.
- Peppers: Vegetable and Spice Capsicicums (P.W. Bosland and E.J Votava)

Goals of Study

- **Find optimum nitrogen (N) application rates for red bell pepper production.**
- **Determine best (N) source to increase red bell pepper yield.**
- **Test the theory "that ABA spray treatments advance the maturity (red color) of bell pepper fruit."**
- **Determine if supplemental (N) applications and ABA treatments are profitable.**

Why Increase Early Red Bell Production?

- **"Colored bell pepper fruits (ripe) attract market values that are three to five times greater than green fruits."**
  Why don't growers produce more field grown colored bells?
- **"High fruit quality and yield of colored fruits are difficult to obtain in open field environments."**
  (http://www.ars.usda.gov/is/np/mba/jun05/pepper.htm)
- **Most colored bells are therefore grown in greenhouse/tunnel settings.**

Why ABA and Why Now?

"Historically, the cost to produce ABA was too high to justify its use as an agrochemical but recently ABA production methods have improved sufficiently to reconsider its potential use in viticulture."
http://ucce.ucdavis.edu/files/datastore/234-1168.pdf

ABA "Abscisic Acid" a seed maturation and Stress-Response Hormone

- http://upload.wikimedia.org/wikipedia/commons/thumb/9/91/Abscisic_acid.svg/200px-Abscisic_acid.svg.png

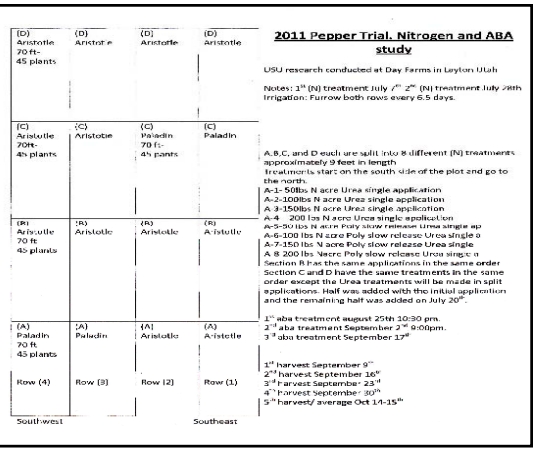
How does it work?

- **"In California, most 'Crimson Seedless' table grapes *are grown in the San Joaquin Valley, a warm-climate* region. Often, 'Crimson Seedless' grapes fail to achieve the desired level of red color, in part due to high temperatures which inhibit the accumulation of anthocyanins (Spayd et al., 2002)."**

Similar Situation for Peppers

- **"Temperature has a large effect on the rate of plant and fruit growth and the development and quality of the red or yellow pigments. Ideal temperature for red pigment development is 65–75°F."**
  http://www.extension.iastate.edu/Publications/PM1888.pdf
- **Carotenoids are responsible for the red color of bell pepper fruits. The major carotenoids are capsanthin and capsorubin.**

Bosland. P. W, Votava. E.J.-Peppers: Vegetable And Spice Capsicums



Important Dates and Definitions

- First supplemental fertilizer application **July 1**
- Second split application **July 28**
- 5 harvests **September: 9, 16, 23, 30 and October 14**
- **Early Red**: Red Bells harvested on the **9th or 16th of September.**

Grade (Size-Classes) for Bell Pepper

Average measure-ment	Weight (Grams)	Weight (Lbs)	Inches Tall	Inches Wide	Number of Lobes
Large	327.00	0.74	4.33	4.25	4
Medium	245.25	0.54	3.94	3.56	3.5
Small	198.50	0.44	3.81	3.38	3.25

Prices

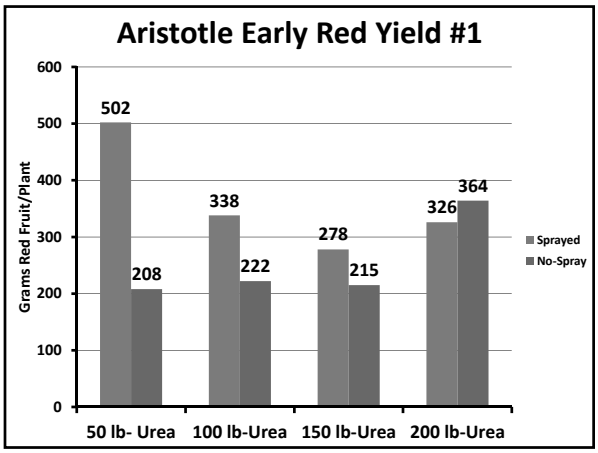
Dollar amounts assigned according to Granato Produce Inc. Wholesale Market Price

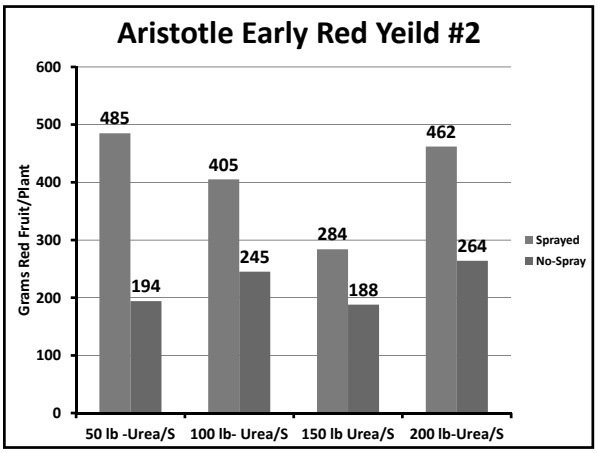
15 lbs red bells- September market= 15 dollars

0 .74 lb Large $0.75/pepper,
0 .54lb Medium $0.53/pepper,
0.34lb Small $0.34/pepper

25lbs green bells- October market= $12.50

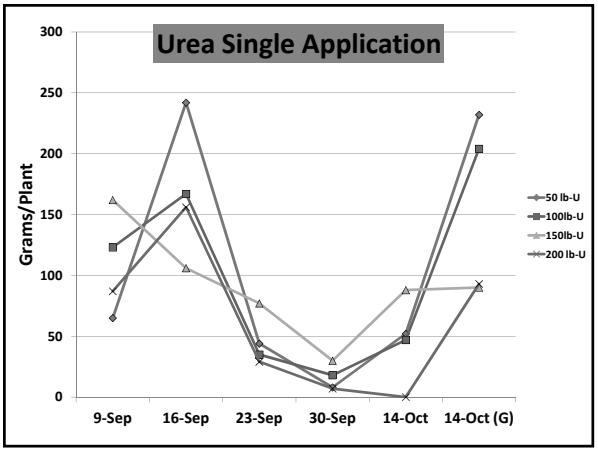
0.74lb Large $0.38/pepper,
0 .54lb Medium $0.27/pepper,
0.34lb Small - $0.22/pepper

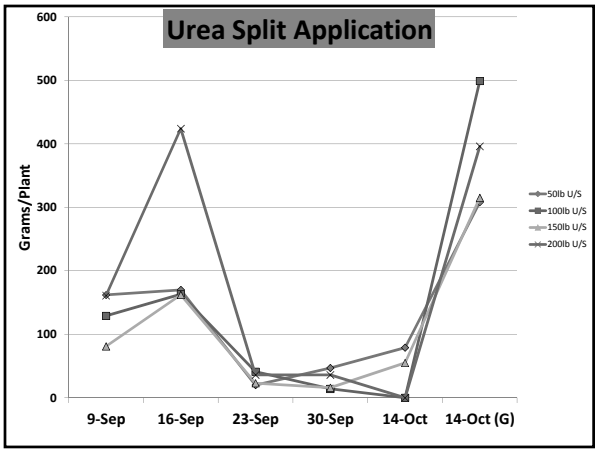


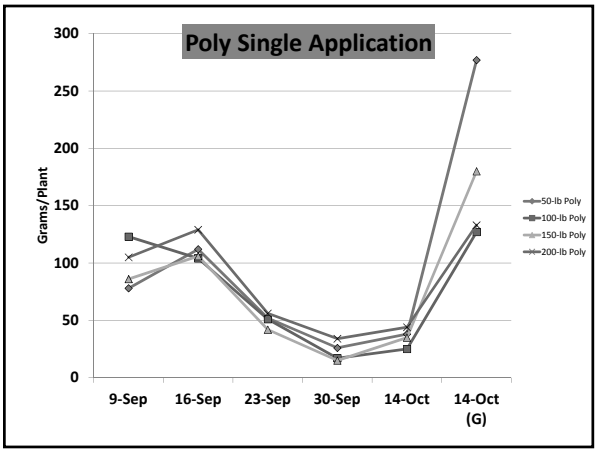


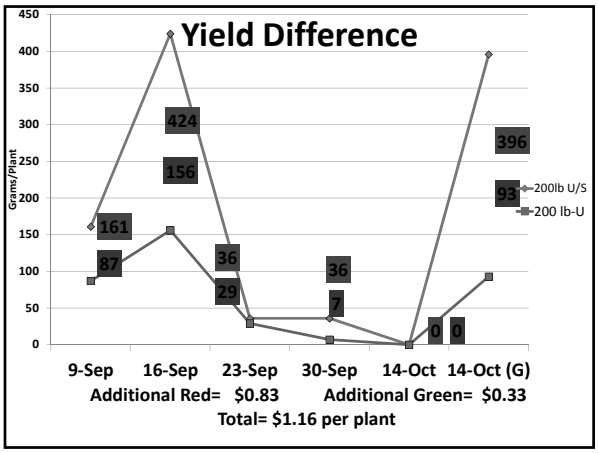
Supplemental (Nitrogen) Treatments

-50, 100, 150 and 200 LB (N)/ACRE
-POLYON, UREA , UREA SPLIT APPLICATION



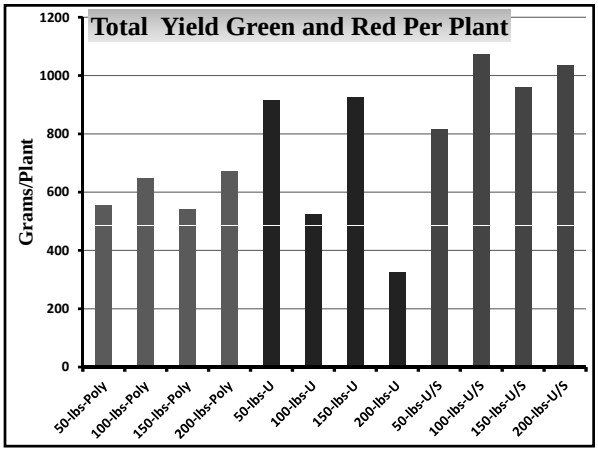






Why go to the extra work?

- Lets compare the difference
- Dollar amounts assigned according to Granato Produce Inc. wholesale market price during Sep and Oct for red and green bells. *Production costs not included.*
- **High yield** -*1.2lb red+ .20 lb green/plant* ***$21,106/ACRE***
- **Medium yield** - *0.7lb red+ 0.22 lb green/plant*
- ***$14,020/Acre***
- **Low yield**- *0.62 lb red+ .39 lb green/plant* ***$10,854.72/Acre***



Finished Product

Summary

- **ABA treatments may prove to be another tool in early red pepper production.**
- **Good production practices combined with applying Urea in split applications can increase early red pepper and late green pepper yield.**
- **An early harvest of red peppers coupled with a late harvest of green fruit could allow a grower to increase production without increasing acreage.**

UtahStateUniversity COOPERATIVE EXTENSION

High Tunnel Strawberry Production

Biographical Information:

Tiffany Maughan
Utah State University

Tiffany Maughan grew up on a small farm in Southeastern Idaho and moved to Logan to attend Utah State University for a Horticulture degree. She will finish her Bachelor's degree in May and will begin Graduate studies in Plant Science in the fall.

Session Description:

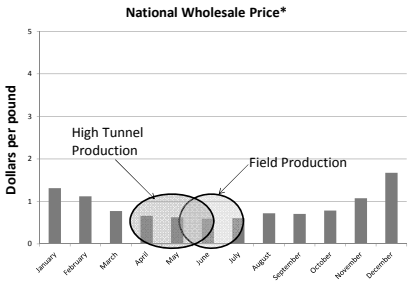
This session will discuss how to be successful with high tunnel production of strawberries in Utah. It will include a discussion of best practices for strawberry production (how to plant, what to plant and when to plant).

High Tunnel Strawberry Production

Tiffany Maughan, Utah State University

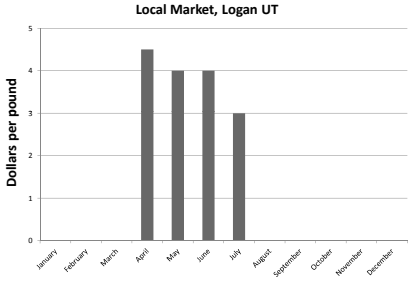


Wholesale vs Local Market Prices



*Data taken from USDA, Economics, Statistics, and Market Information System

Wholesale vs Local Market Prices



Why high tunnels for strawberries?

- Extending the season
  - Not for wholesale price
  - Must capture local market and supply premium fruit
- Frost protection

Need for frost protection

- Spring frosts kill early blossoms
- First blossoms produce the most and largest fruit
- Must provide frost protection

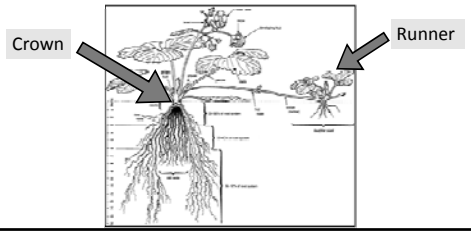
High Tunnel Production

- Provide frost protection, increase yields
- Extend season earlier into spring
  - Charge premium prices at local markets

Production Systems
Matted Row & Annual Hill

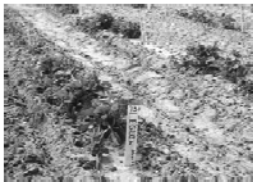
Strawberry Growth

- Matted row: maximize runner production
- Annual hill: maximize crown development



Matted Row

Advantages	Disadvantages
– Low planting costs	– Smaller fruit
– Lower management inputs	– More difficult to harvest
– Perennial system	– More fruit rot
• Replace ~5 years	– Fruit is dirty
	– Weed problems



Annual Hill

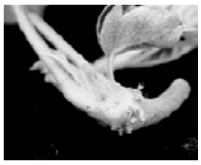
Advantages	Disadvantages
– Weed control	– Higher establishment costs
– Ease of harvest	– Must be replanted every year
– Earlier harvest	
– Larger fruit	– Requires plug plants in colder climates
– Cleaner fruit	

Plug Production
Establishing Mother Plants

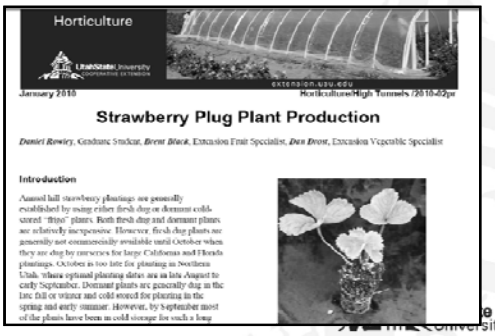
- Dormant plants in gutters
- Runner production ~8 weeks after planting
- Flowers should be removed to encourage runner formation

Plug Production cont.
Runner Removal for Plug Plants

- Harvest runners when root pegs are visible
- Plant in soil immediately and place in mist chamber
- Allow 3-4 weeks for roots to form before planting



tunnel.usu.edu


Horticulture

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January 2010 Horticulture/High Tunnels /2010-02pr

Strawberry Plug Plant Production

Daniel Rowley, Graduate Student, *Brent Black*, Extension Fruit Specialist, *Dan Drost*, Extension Vegetable Specialist

Introduction

Annual hill strawberry plantings are generally established by using either fresh dug or dormant cold-stored "frigo" plants. Both fresh dug and dormant plants are relatively inexpensive. However, fresh dug plants are generally not commercially available until October when they are dug by nurseries for large California and Florida plantings. October is too late for planting in Northern Utah. Where optimal planting dates are in late August to early September. Dormant plants are generally dug in the late fall or winter and cold stored for planting in the spring and early summer. However, by September most of the plants have been in cold storage for such a long

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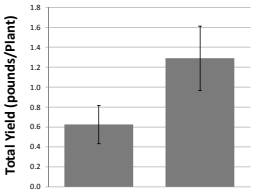
Another option

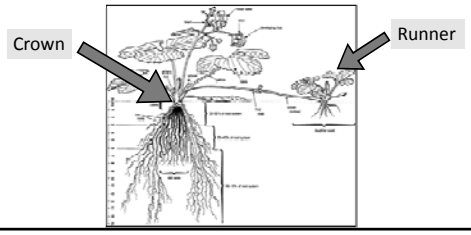
Dormant Plants

- Pros
  - Lower cost per plant ~$0.10 per plant
  - Widely Available
- Cons
  - Storage issues
  - Planted end of July
  - High runner production
  - Lower yields

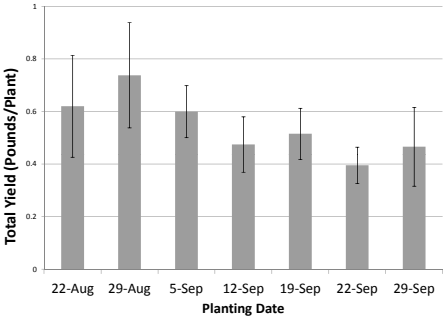


Determine Planting Date

- Too early = lots of runners
- Too late = not enough crown development
- Optimum = 4-6 crowns per plant for maximum yields



When do we plant?



Optimal dates are for Cache Valley, UT
Dates will vary by area

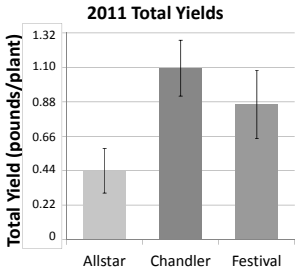
What do we plant?
June Bearing Varieties Compared

Cultivar	Origin	Characteristics
Allstar	Maryland	Eastern cultivar selected for matted row, but also well adapted to eastern annual hill system.
Chandler	California	Older California cultivar well adapted to cold climate annual hill systems.
Festival	Florida	Newer cultivar adapted to low light winter production.

Taste Test Results

- Best Appearance:
  - 1st Chandler
  - 2nd Allstar
  - 3rd Festival
- Best Taste:
  - 1st Allstar
  - 2nd Chandler
  - 3rd Festival

June-Bearing Varieties Compared
Plug plants, 29 Aug



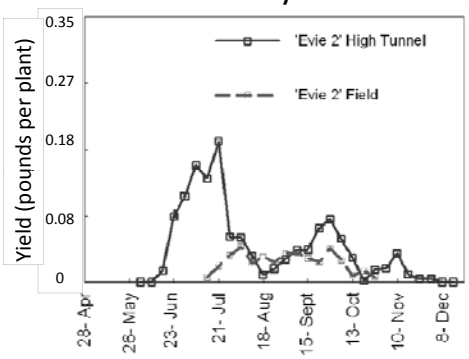
Economics

- Average over multiple years was **0.87 lbs per plant** (Chandler)
- Local prices
  - Average **$4.00/lb**
- $3758 per 90' house
- Costs: $2656
- Return: **$1102**

How intensely can we manage?

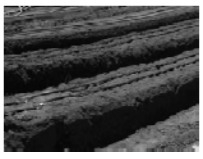
- Vertical gutters
  - Take advantage of more tunnel space
  - Must be taken down in winter
  - Prohibitive labor costs
  - Not economically viable

What about day neutrals?

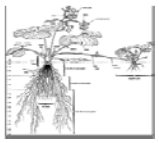


Fall-Planted, Annual Hill System

- Raised beds formed
- Install Drip Tape Irrigation
- Cover with black plastic
- Plant Spacing: 12'' apart, alternate row

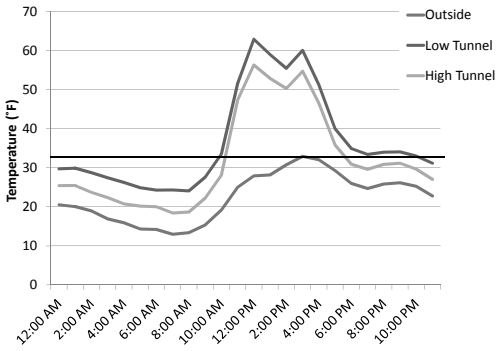


Wintercare

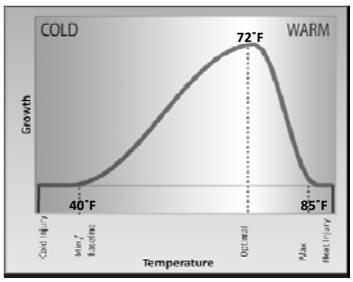


- Runner & Flower Removal
- Low-Tunnel
  - Ventilation

Low Tunnel Ventilation



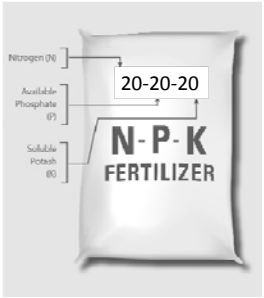
Ventilation Critical For Temperature Management



Strawberry Minimum, Optimal, and Maximum Temperatures

Fertilizer

- Injected in water and applied through drip tape
- 20-20-20 applied during growth period
- 10-20-15 applied during fruiting period



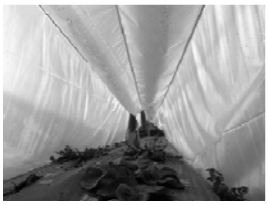
Timeline cont.

- Harvest
  - Begin mid-April
  - Finish early-July
- Remove plants
  - Plant new fall plants

Continuing Research

- Effects of soil heating during winter
  - Bury heating cables two inches into top of bed

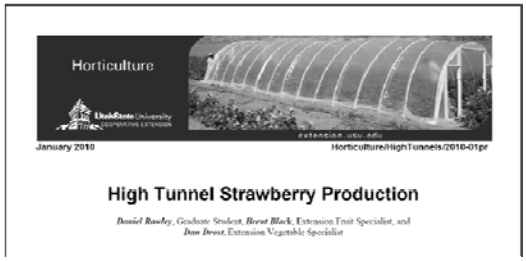
Continuing Research



- Can we achieve similar results with a low-tunnel only system?
- Find a commercial low tunnel picture

Complete production information

tunnel.usu.edu or fruit.usu.edu



For more great information

tunnel.usu.edu or fruit.usu.edu

Acknowledgements

- Funding

Utah Agricultural Experiment Station

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•People

Dr. Brent Black
Dr. Dan Drost
James Frisby
Taunya Ernst
Michelle Higley

Memory, Romance and Trust. Make Your Story Compelling and Grow Your Business

Biographical Information:

David Vogel
Edible Wasatch Magazine

Rachel Hodson
Edible Wasatch Magazine

Edible Wasatch is a locally and independently owned member of Edible Communities Inc. We believe in knowing where our food comes from. Our mission is to inspire readers to explore our regional food system and support local producers, restaurants and related businesses by voting with their forks. In our pages (and on our website) you will find stories about the hard work and delicious payoffs that growers, chefs and food artisans contribute to our community. As awareness grows about how urgently we need to rethink our relationships to food, more and more people are seeking out good food and finding new ways to engage every day. We invite you to join us in celebrating their efforts.

Our vision is of a future where choosing to produce food in a way that can be sustained indefinitely is easier than it is today. Where small and mid-sized farms are economically viable enough to resist the encroachment of development. Where our health care budgets decrease significantly and provide a little more money to spend on high quality food and we gauge our prosperity not by how cheap we can make our food, but by how well we can feed ourselves.

Session Description:

Consumers now have a deeper curiosity about where their food comes from. Oftentimes, great products don't get the attention they deserve because they are not marketed in a way that expresses the information consumers want to know. This session will help you understand what it is that potential customers want to know about you and know how to identify what's special about your business and how to communicate it to the media and to the market.

The Berry Patch: Selling Every Berry and a Little Bit More

Biographical Information:

David Cornaby
Cornaby's

David Cornaby was born into a fourth generation farming family. He moved away to work in the computer industry, but moved back to run the family farm. David wanted to do something different than hay and grain, so planted raspberries and bought a mechanical raspberry picker to make things a little easier. All of the irrigation is subsurface drip and fertilizer is applied with the irrigation water. The trick is to find a way to sell every berry, so he started a sister company that makes raspberry products and complementary products.

Session Description:

This session will discuss the following:

1. Summary of sales & marketing issues to be addressed
2. Your customers may visit only once, --how to help them buy more and like it
3. What is co-marketng, and how does it work?
4. Be prepared – solving your customer's needs with your products

Cornaby's
Bringing you Nature's Best

Dave Cornaby
President
(801) 472-8365

How to Sell Every Berry and a Little More

Family Farm in Salem, Utah

Berry Farmer Challenges

- Grow a wonderful crop
- Harvest the berries
- Cool and preserve a perishable product
- Sell the berries
  - Farmer's Markets
  - Wholesale
  - Straight from the Farm
- But sometimes
  - Supply exceeds demand
  - Good but less attractive berries
  - Over-ripe Berries

Selling Every Berry – Not so Easy

- Inter-week demand fluctuation
  - Strong Thurs / Friday for weekend Farm Mkts
  - Saturday farm customers
  - Monday / Tuesday / Wednesday – weak
- Package type demand varies
  - Clamshells for grocery, convenience customers
  - Flats for processing (jam, canning, freezing)

Selling Every Berry

- What do your customers really want?
  - Farm Fresh / Natural Food
  - Family Experience
- What do you want?
  - Expanded customer base
  - Sell more to each customer
  - Make customers for life
  - Reasonable price for your product

Selling Every Berry - Strategies

- Spend the time to talk
  - Know your product – educate your customer
    - Facts about nutrition
  - Tell / Show them how to use your product
    - Recipes that use your product (in bulk?)
  - Give samples – compare with "plastic food"

Selling Every Berry - Strategies

- Family Experience
  - Plan for children (samples? Show how to pick?)
  - Sell treats to enhance the experience
  - Strategy to meet customer needs
    - Water & etc.
    - Shade

Selling Every Berry - Strategies

- Co-marketing to increase per customer sales
  - Selling complementary products
  - Sampling prepared product
  - Be prepared to meet objections
    - I don't can anymore …. Buy it readymade
    - I have never made it …. Here is a easy way
    - I'm diabetic …… Here is a sugar-free version
    - I'm gluten intolerant ….. Here is an alternative

Selling Every Berry - Strategies

- Customer for Life
  - Gather customer info: email or social media
    - Easier to use than individual phone numbers
    - Use to announce availability / specials / etc.
  - Be interested in your customers and show it
- Reasonable Price
  - Know pricing – grocery store, farm mkt, etc.
    - Few grow rich trying to be the low price leader
  - Know your production costs
    - None succeed by selling below their cost
  - You have a quality product – expect a reasonable price

Selling Every Berry – Value Add

- To sell every berry -- become your own customer
  - Process berries to become spreadable fruit, syrup, vinegar, sauces, squeezable fruit, etc.
  - Dry your fruit (Southridge Farms)
  - Milk to cheese (Beehive Cheese)
- Consider carefully if the price of selling every berry is worth the cost of starting another business ..

Factory in Spanish Fork

Cornaby's Products

- Fresh raspberries, Honey, Jam in a Jiffy
- Spreadable Fruit made in Utah with Utah fruit
  - Reduced Sugar, All Natural, High in Vitamin C and antioxidants, Tastes GREAT
- Savory Sauces (raspberry Jalapeno, raspberry chipotle)
- UltraGel & Thick Gel - Gluten Free Instant thickeners
- Ten Calorie / Diabetic Friendly Preserves
  - Naturally controls blood sugar, zero calorie Stevia
- Fruitivia Squeezable Fruit
  - Convenient, low calorie, high fiber, high antioxidant

Questions?

Working With Your Local Conservation District

Biographical Information:

Desiree Van Dyke
Lars Christensen
Utah Association of Conservation Districts

Desiree Van Dyke became the Utah Association of Conservation District (UACD) Zone Coordinator in May 2007. She serves as staff for the Davis, Morgan and Weber Conservation Districts. Desiree graduated from the Department of Agriculture at Utah State University in 2005 with a Masters Degree in Urban Water Conservation and has an USU undergraduate degree in Horticulture. Desiree lives in Salt Lake County with her husband and two children. She enjoys gardening, biking, hiking, reading, travel and hard work.

Lars Christensen became the UACD Zone 3 coordinator in January of 2012. He serves as staff for the Summit, Kamas Valley, Wasatch, Timp-Nebo and Alpine Conservation Districts. Prior to his work as Zone Coordinator he was employed by the Kamas Conservation District as the Upper Weber Watershed Coordinator. Lars graduated from Utah State University in May 2009 with a B.S. degree in Environmental Soil and Water Sciences. Lars lives in Upton Utah with his wife and five children. Lars spends his free time ice fishing, camping and playing with his kids.

Session Description:

This presentation is an overview of what Utah's conservation districts can do for landowners. Services offered range from agricultural technical assistance, conservation planning and help for obtaining conservation funding to education and outreach programs.

SARE Funding Programs for Producers

Biographical Information:

Phil Rasmussen
Western SARE

Dr. Phil Rasmussen is a professor of Soil Science at USU and the director of the Western SARE Center. The Western SARE Center manages ($55 million) competitive research grants in all western states and island protectorates. Phil has been the coordinator of Western SARE since 1994 and has been a member of the national SARE advisory board since 1988. As director, Phil is also an assistant director in both the Utah Agricultural Experiment Station and the Utah State University Cooperative Extension Service.

Phil earned a B.S. in soil science with a minor in Physics in 1974 at USU where he was a Phil Kappa Phi honoree and Honors graduate. He earned an M.S. in soil physics at USU in 1976 and a Ph.D. in soil physics and microclimatology at Kansas State University in 1979. After joining the faculty at USU in 1981 as an extension soils specialist, Phil earned the nickname “No-Till Phil” in Utah for his Johnny Appleseed approach to scattering on-farm research plots across the state.

Session Description:

Dr. “No’Till” Phil Rasmussen, director of the Western SARE Center, will speak on the unique mission of the Western SARE program. The Center receives approximately $4.2 million/year from USDA-NIFA to fund competitive proposals for sustainable agriculture research and education. SARE’s mission is to advance – to the whole of American agriculture – innovations that improve profitability, stewardship and quality of life by investing in groundbreaking research and education. One of SARE’s unique missions has been to fund farmers and ranchers to do cutting-edge research on their own farms and ranches. Western SARE issues Calls for Proposals for seven different competitive grants program (including Farmer/Rancher grants) in April of each year.

SARE *what is* Sustainable Agriculture Research & Education?

In 1988, the U.S. Department of Agriculture launched an innovative grassroots research and education grants initiative, known as the Sustainable Agriculture Research and Education program (SARE), designed to sustain American agriculture, protect the environment and strengthen rural families and communities. In its 20 years, SARE has funded more than 3,000 competitive research and education grants nationwide to producers, scientists and ag-support professionals. The resulting techniques and practices have, in turn, been communicated to other producers and ag professionals, a virtual exponential spread of new knowledge with numerous sustainable benefits.

SARE is distinctive and inclusive

- SARE is managed from centers in four regions (Western, Northeast, North Central and Southern), each overseen by an advisory council of local leaders with broad geographic representation and agricultural expertise.
- Farmers and ranchers must be involved in *all* SARE grants, ensuring practical solutions to real challenges.
- Projects are funded based on their merits and potential for achievement as gauged by a rigorous, competitive review process.
- Through SARE and its funded projects, farmers and ranchers of varied backgrounds and practices are brought to the table with university scientists, extension professionals and others to examine issues of sustainability in agriculture.
- SARE advisory councils continually emphasize solutions that involve and embrace multiple disciplines, institutions and states.

Western SARE region

The Western SARE region has a diversity of agriculture and a broad geographic range that encompasses 13 states and four Pacific island protectorates:

Alaska	California	Hawaii	Montana	N. Mariana Islands	Washington
American Samoa	Colorado	Idaho	Nevada	Oregon	Wyoming
Arizona	Guam	Micronesia	New Mexico	Utah	

For more information about the Western SARE program & Western SARE grants, go to **www.westernsare.org**

SARE *how to apply for a* Western SARE *grant*

SARE is a USDA competitive grants program that supports agricultural systems that are economically viable, environmentally sound and socially responsible. Grant applications consistent with the Western SARE goals listed below have the best chance of being funded.

Western SARE goals

- Promote **good stewardship** of the nation's natural resources using site-specific, regional and profitable sustainable methods.
- Enhance the **quality of life** of farmers and ranchers and ensure the viability of rural communities.
- Protect the **health and safety** of those involved in food and farm systems.
- Promote crop, livestock and enterprise **diversification**.
- Examine the **regional, economic, social and environmental implications** of adopting sustainable practices.

Applying for a grant

1. Visit **http://wsaregrants.usu.edu** and click on "Apply For a Grant"
2. Choose a grant to apply for (information on each grant can be found by downloading the Call for Proposals)
3. Submit your proposal according to the directions found on the Call for Proposals

WESTERN SARE
Sustainable Agriculture Research & Education

What else you'll find on the website...

Get grant writing tips • Browse funded projects • View budget details • Download publications • Plan to attend conferences • Access the National SARE website • Contact Western SARE staff

For more information about the Western SARE program and grants, go to **www.westernsare.org**

Western SARE grants

Research and Education	Professional Development	Producer	Professional + Producer	Graduate Student
These grants involve scientists, producers and others using interdisciplinary approaches to address issues related to sustainability in agriculture.	These grants focus on training agricultural professionals, to help them spread knowledge about sustainable agriculture concepts and practices.	These one- to three-year grants are conducted by agricultural producers with support and guidance from a technical advisor.	These grants are similar in concept to the Producer grants, although instead of a producer serving as the project coordinator, an ag professional coordinates the project.	These grants are offered to eligible masters or doctrate students enrolled full time at accredited colleges or universities in the Western region.

Early-Season Production of Green Beans Using High Tunnels

Biographical Information:

Dr. Dan Drost
Utah State University

Dan Drost grew up on a small diversified farm in western Michigan. He graduated from Michigan State University with a master's degree in Horticulture with an emphasis on vegetable production and physiology. He earned his PhD from Cornell University in Vegetable Crops. Prior to arriving in Utah, he taught horticulture in New Zealand and has worked for Utah State University since 1992. In addition to his research work with vegetables, Dan is interested in small farm production systems, organic agriculture, the creation of efficient farm systems, and intensive farm and land management.

Session Description:

During the presentation, Dan Drost will outline the concepts behind early season green beans in high tunnels. We will show that stand establishment is critical to later season productivity. While we were able to achieve earlier production, use of row covers was not efficient for getting good stands. Preliminary economic evaluation shows that beans can be productive and profitable. By the end of the presentation those attending will better understand the ways high tunnels can help a farm diversify and they should have a working knowledge of the benefits and constraints.

Early-season Production of Green Beans Using High Tunnels

by

Dan Drost and James Frisby

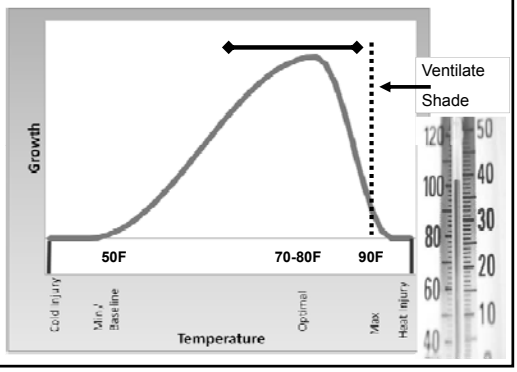
Overview

- Why Beans
- Environmental Requirements
- Optimizing Planting Dates
- Productivity Potential
- Summary

Beans: Out of Season Production

- Capture market when there is little supply available locally
- Requested in the Local Market
- Direct Markets
- Demand a price premium
- Availability - ~ Late July

Temperatures and Bean Performance



Bean Temperature Response

Growth Stage	Temperature (F)
• Germination:	60; 80; 95
• Vegetative Growth:	55; 70; 95
• Flowering:	55; 70; 90
• Pod Sizing:	55; 70; 90
	Min; Opt; Max
	65-75

High Tunnel Beans

- ID Appropriate Planting Dates
- Deciding on Varieties
- Using Secondary Covers
- Plant Establishment

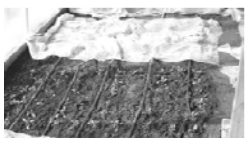


Table 2. Climate information for cities throughout Utah.

	Last Spring Freeze			First Fall Freeze			Freeze-Free		
LOCATION	**Early**	**Avg**	**Late**	**Early**	**Avg**	**Late**	**Early**	**Avg**	**Late**
BEAR LAKE	10-May	29-May	21-Jun	24-Aug	20-Sep	18-Oct	82	114	160
BRIGHAM CITY	9-Apr	4-May	2-Jun	4-Sep	11-Oct	13-Nov	111	159	206
CEDAR CITY	29-Apr	14-May	5-Jun	24-Sep	9-Oct	26-Oct	128	147	158
DELTA	15-Apr	17-May	19-Jun	2-Sep	28-Sep	28-Oct	75	133	183
LOGAN	25-Apr	14-May	21-Jun	30-Aug	26-Sep	24-Oct	94	135	182
MOAB	8-Mar	17-Apr	18-May	16-Sep	17-Oct	9-Nov	136	184	239
OGDEN	18-Apr	13-May	16-Jun	10-Sep	7-Oct	26-Oct	92	147	182
PARK CITY	8-Jun	14-Jun	21-Jun	27-Aug	6-Sep	14-Sep	78	83	98
RICHFIELD	18-Apr	27-May	20-Jul	23-Aug	20-Sep	16-Oct	49	116	164
SALT LAKE CITY	19-Mar	12-Apr	30-Apr	11-Oct	31-Oct	21-Nov	175	203	233
ST. GEORGE	12-Feb	6-Apr	20-May	21-Sep	28-Oct	24-Nov	135	205	268
VERNAL	21-Apr	27-May	4-Jul	27-Aug	22-Sep	23-Oct	62	118	158

http://climate.usu.edu/

Potential Varieties

<u>Bush Beans</u>

- Provider (50 day)
- Foremost (53)
- Jade (53)
- Savannah (55)
- Crockett (60)
- Rocdor (53) wax
- Slenderwax (56)

<u>Pole Beans</u>

- Northeaster (56)
- Fortex (60 day)
- Kentucky Blue (63)

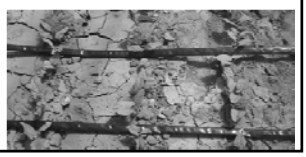
Methods

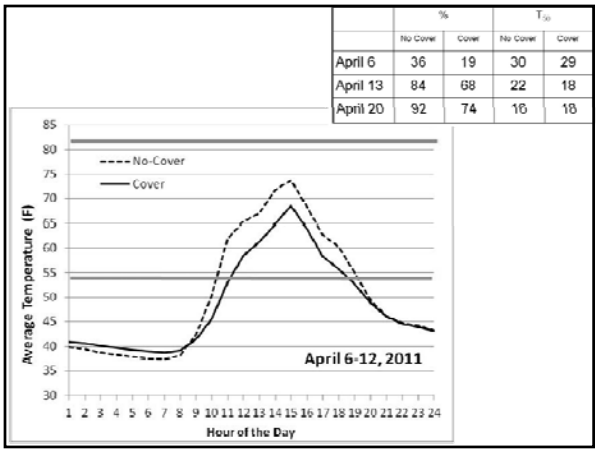
- Bean Variety "Provider" 50 day
- 3 Replications
- Uncovered vs. Covered (Agribon AG19)
- 3 Planting Dates (April 6, 13, 20)
- 100 seeds per plot (4 ft wide * 5 ft long)

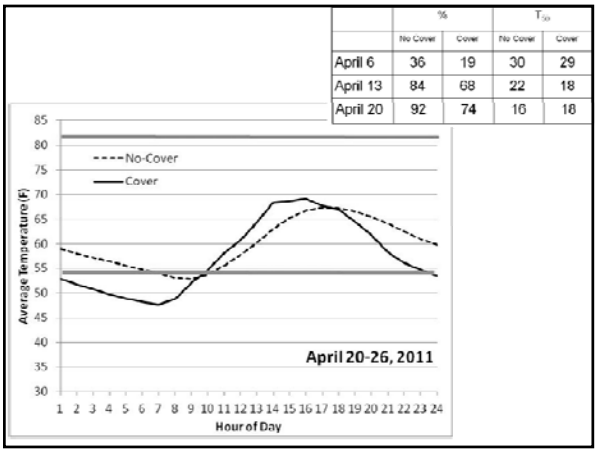
Emergence (%; time to 50%)

	%		T_{50}	
	No Cover	Cover	No Cover	Cover
April 6	36	19*	30	29
April 13	84	68*	22	18
April 20	92	74*	16	18

% emergence = emerged / planted
T50 – days to half emergence







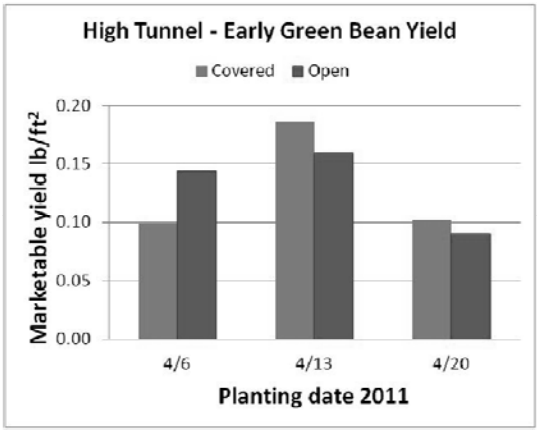
Harvest Information

- Earliness
- Total Production
- Economics

Earliness June 24 to July 5

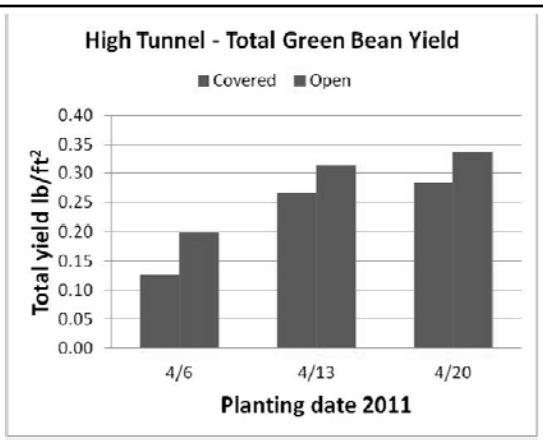
	Covered		Uncovered	
	lb/ft^2	lb/$_{tunnel}$	lb/ft^2	lb/$_{tunnel}$
April 6	0.10	135	0.14	188
April 13	0.19	255	0.16	215
April 20	0.10	135	0.09	121
	0.07		0.05	

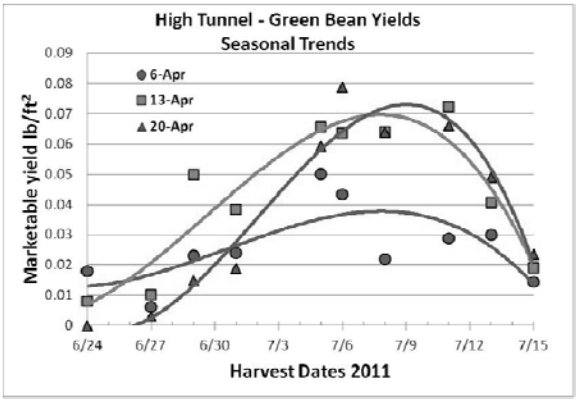
lb/tunnel based on 1345 sq ft growing space



Total Production (lb/ft^2)

	Covered		Uncovered	
April 6	0.21	282	0.31	417
April 13	0.42	565	0.44	591
April 20	0.36	484	0.40	538
	0.12		0.08	





Financial Sustainability?

14' by 96' High Tunnel

Units	Quantity	Price	Total
lbs	550	$2.50	$1,375.00

Total Labor	$520.00
Total Supplies	$112.00
Annual Operating	$632.00
Annual Deprec (Hi/lo tunnels)	$250.00
Annual Deprec (irrigation)	$60.00
Total Expenses	$942.00
Net Income	$433.00

Annual operating & Annual Depreciation Based on **BEANS** only

LABOR	HOURS	Cost ($)	
soil test + application	1.5	10	$15.00
Tillage	1	10	$10.00
Drip Install	2	10	$20.00
Planting	1.5	10	$15.00
Seed bed Coverage	1	10	$10.00
Weeding	3	10	$30.00
Irrigation etc.	4	10	$40.00
Harvest	35	10	$350.00
Cleanout	3	10	$30.00
			$520.00

SUPPLIES	units	No.Units	Price ($)	
Soil Test	each	1	14	$14.00
Fuel	gal	1	3	$3.00
Fertilizer	lbs	10	1	$10.00
Drip Tape	ft	1000	0.05	$50.00
Seed	1000's	5	1	$5.00
Urea	lbs	5	1	$5.00
Harvest Containers	bags	1000	0.025	$25.00
				$112.00

Summary

- **Early planting dates did not generate earliness or improve yields (poor plant stands)**
- **Planting by mid-April adequate for acceptable stands and productivity**
- **Use of floating row covers not advised due to in adequate soil warming. Plastic tunnels or plastic sheets over rows may help more. Will test in 2012.**

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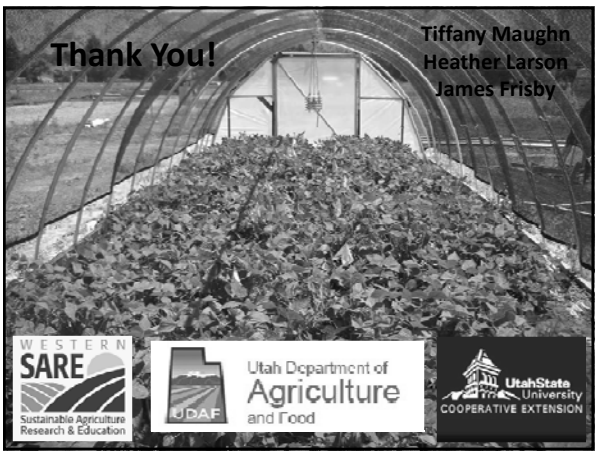
Conclusion continues

- Additional economic data needed to assess what local markets will tolerate.
- Want to get early June production which would allow fall planting of tomatoes.

Opportunity Grows

- Profitability?
- **Diversification**
- Marketing Issues
  - Consistent supply
  - Consumer Demand
  - Sustainable



Establishing High Tunnels in Communities

Biographical Information:

Randy Emm
Indian Reservation Program Coordinator
University of Nevada Reno

Randy Emm, is the current program coordinator for the Indian programs at the University of Nevada Cooperative Extension (UNCE). He was born and raised on the Walker River Indian Reservation, attending schools on and off the reservation. He is familiar with Farm Service Agency programs, Natural Resource and Conservation Service programs, the Bureau of Indian Affairs Departments with their rules and regulations, and the process and challenges faced in getting USDA programs up and running on Indian Reservation Land.

Session Description:

Randy Emm has worked others to put up community hoop houses on various Indian Reservations in Nevada. He has worked with individuals, Tribal Governments and other organizations. Their goals are to provide families with fresh fruits and vegetables and then produce fruits and vegetables to sell. He will talk about the original motivation for the project. This session will cover both the successes and challenges in working in this type of environment.

Farming in an Urban Environment

Biographical Information:

Ryan Schmidt
Richard Schmidt
Schmidt's Farm and Greenhouse

The Schmidt family started farming in rural West Jordan around 1910 and primarily grew hay, grain, sugar beets and some field corn. They then started to grow a variety of crops for local canneries including tomatoes, beans, peas, and sweet corn. As a way to make money for school the kids started selling corn on the side of Redwood road. Richard has continued that tradition of farming and selling produce direct to the community.

Richard helped his dad with farming while growing up, and in 1972 he got married and leased the farm to begin farming full time. In the time since he and wife have tried a number of different endeavors however farming has always been a part of their lives and still is today. The farm business has grown to include several greenhouses for raising annual flowers and planter pots along with vegetable starts for the farm. Also with overseeing the greenhouses, Richard focuses on raising fresh produce for local markets in the Salt Lake Area. Richard and his wife have 6 married children, and he has served on the Salt Lake County Farm Bureau board as a member or president for nearly 20 years.

Ryan is the 4th Generation to farm and in 2004 after graduating in Horticulture from Utah State University he started to farm full time with Richard. He grew up farming as the surroundings changed from a rural to an urban environment, He is married and has 4 children, he served on the board of the Salt Lake County Farm Bureau for 3 years and also serves in the Navy Reserves. He also raises goats, and eggs on a small farm in South Jordan.

Farming in the Salt Lake Valley has had many challenges and changes, but continues to be a viable business.

Session Description:

Farming in an urban environment can present some challenges and opportunities. While there may be a readily available customer base for marketing your products, running the day-to-day farm operations can create tension. Common farm practices like irrigation, land preparation, and weed and pest management may not be viewed favorably by the community. Richard and Ryan will use this session to discuss how their urban farm operates, describe some of the challenges, and how they are successfully working through these issues. They will also talk about how to benefit from urban growth and their future in farming.

Wind Uprising, The Documentary

Biographical Information:

Edwin Stafford
Jon M. Huntsman School of Business
Utah State University

Edwin R. Stafford, Ph.D., is Professor of Marketing and director of the Center for the Market Diffusion of Renewable Energy and Clean Technology at the Jon M. Huntsman School of Business at Utah State University in Logan. He has been researching "green marketing" and renewable energy diffusion for over 15 years, and his research has appeared in a variety of business, environmental policy, and sustainable development journals. Ed is also a frequent public speaker and media source on business sustainability issues and renewable energy development. His documentary, "Wind Uprising," produced in collaboration with Cathy Hartman (Utah State University) and Michelle Nunez (GreenTech Films) has been screened nearly 100 times across the country since its release in 2010, and it has won three awards at film festivals and energy conferences.

Session Description:

"Wind Uprising," the documentary, tells the story of the four-year struggle to establish Utah's first commercial wind power project at the mouth of Spanish Fork Canyon as told by the developers, policymakers, and others who made it happen. The film depicts the common roadblocks that face clean energy development in communities -- legislative barriers, fickle investors, pricing conundrums with the utility monopoly, not-in-my-backyard resistance that almost derailed the project – and the solutions discovered in Spanish Fork. Producer/writer Edwin Stafford will field audience questions about local wind power development after the screening.

Wind Uprising , a documentary film, chronicles the turbulent journey that a wind entrepreneur and an engineer trail blazed to bring wind power to their home state of Utah. They faced stiff headwinds at every turn, including policy barriers, fickle investors, transmission limitations, and resistance from nearby residents that nearly derailed the project. The film details the common market, policy, and community roadblocks that might hinder wind energy development and the solutions that were discovered in Spanish Fork, Utah. Their inspiring story provides important ideas for policymakers, regulators, and residents about how they may encourage wind power development in their communities.

Cathy Hartman and **Edwin Stafford** are marketing professors at the Jon M. Huntsman School of Business at Utah State University who have been studying the market diffusion of renewable energy and clean technology since the 1990s. They were engaged with local grassroots and entrepreneurial efforts to jumpstart wind development in Utah and immediately recognized the historic significance of the building of Utah's first wind project. The success of clean energy hinges on not only establishing markets for utilities, but building social movements in communities as well.

As they witnessed an idealistic developer enduring a protracted struggle to establish a small wind farm at the mouth of Spanish Fork Canyon, Ed and Cathy were inspired to capture and preserve his story on film. Given their desire to produce a professional portrayal, they collaborated with **Michelle Nunez** of GreenTech Films who brought the story to an HD documentary film.

www.winduprisingmovie.com

Major Screenings

- Western Governors Association (2010)
- Community Wind Across America (2010, 2011)
- Asia Pacific Clean Energy Summit (2011)
- Colorado Environmental Film Festival (2011)
- Mountaintop Film Festival (2011)
- Environmental Protection Agency (2010)
- Utah League of Cities and Towns Conference (2010)
- Indie Spirit Film Festival (2010)
- New Orleans Film Festival (2010)
- The Leonardo (2012)

Awards

- Seven Summits Award, Mountain Film Festival (February 2010)
- Silver Sierra Award, Yosemite Film Festival (October 2010)
- Yes in My Backyard Award, Community Wind Across America Conference (February 2011)

Creative Team

***Michelle Nunez**, Producer/Director*

***Cathy Hartman** and **Edwin Stafford**, Producers/Writers*

Contact

Ed.Stafford@usu.edu
435-797-3890 office

The Five Biggest Estate Planning Mistakes Agricultural Families Should Never Make

Biographical Information:

Matthew Mitton
The Law Firm of Jones Waldo Holbrook & McDonough

Matt Mitton is a shareholder at Jones Waldo. Mr. Mitton specializes in estate and tax planning. Matt travels throughout the West helping families, business owners and farmers make certain their hard-earned estates will go to the right people, at the right time, at the least cost possible. Mr. Mitton works with clients to create an estate plan that will reduce or eliminate inheritance taxes, avoid probate and preserve family harmony. Whether it's a carefully drafted trust, or a limited liability company, power of attorney or medical directive, a comprehensive estate plan will always provide peace of mind.

Session Description:

This session will talk about wills versus trusts; inheritance tax rates; how to successfully and fairly transition farms from generation to generation fairly; how the IRS values and taxes farms and ranches; and estate planning techniques to eliminate taxes, probate and family disharmony.

Keynote: The Future of Utah Agriculture

Biographical Information:

Leonard M. Blackham
Utah Department of Agriculture and Food

Leonard M. Blackham was appointed Utah Commissioner of Agriculture and Food January 5, 2005, and he is the Immediate Past President of the National Association of State Departments of Agriculture (NASDA). Prior to his appointment to the UDAF, Leonard served in the Utah Senate for 12 years. While serving in the senate, he was in leadership positions for 10 years where he served as Senate Budget Chairman, Majority Whip and Majority Leader. Leonard chaired many commissions, committees, and taskforces on water, energy, agriculture, wildlife, mental health and the legislative process. Prior to his service in the Senate, he was elected to the Sanpete County Commission where he served for four years. Leonard was also elected chairman of the Utah Association of County Commissioners.

Commissioner Blackham grew up and still lives in the small town of Moroni, Utah where he was the son of a turkey producer and the grandson of a crop farmer and sheep rancher. In his youth he participated in 4-H and FFA. His family, church, scouting, and farming have always been the center of his life. He married Laura Bagley and they have six children and eleven grandchildren.

He took over the family the turkey business in 1970 and expanded the ranch from 30,000 to 360,000 birds per year. The Blackham farm markets its turkeys to the Moroni Feed Company, a fully intergraded turkey cooperative that employees more than 800 people and markets its product under the Norbest brand name. The company has three divisions; hatchery, feed mill and processing plants. Moroni Feed processes more than 5 million turkeys a year that are raised by its member farmers. Commissioner Blackham has been a member since 1970 and served as chairman during his many years on the board of directors. Just prior to being named Commissioner of Agriculture and Food, he was the first vice-president and feed division manager for Moroni Feed Company.

Over the years he has been associated with the Utah Farm Bureau Federation where he has served on state and national poultry advisory boards, as well as county boards and many special taskforces. The Utah Farm Bureau has recognized him with the “Friend of Agriculture” award.

Leonard’s early service was focused on scouting. He has served many years as scoutmaster to local troops, national jamboree troops and leadership training courses. He was also deeply involved in the Utah Young Farmers Association. He served as the association president and later as an advisor to the Sanpete Chapter for a number of years.

Evidence Based Mineral Nutrition for Small Fruit Crops

Biographical Information:

Teryl R. Roper
USU Dept of Plants, Soils, and Climate

Teryl Roper is Professor of Pomology and Dept. Head at Utah State University. He served for 20 years as Extension Fruit Crop Specialist at the University of Wisconsin-Madison. He conducted research on mineral nutrition of cranberry and taught an undergraduate course on Mineral Nutrition of Perennial Fruit Crops. Dr. Roper is a native of Utah and grew up surrounded by orchards in Utah County.

Session Description:

Making decisions about fertilizer application is a similar process to other management practices. Growers can collect information that will help them decide how much fertilizer and what kind of fertilizer is needed. Interpreting fertility information is not difficult. At the conclusion of the presentation, growers should know how to take soil and tissue tests, interpret the results, and decide how much fertilizer, if any, is needed.

Effective Marketing Strategies for Establishing and Sustaining a CSA

Biographical Information:

Roslynn Brain
Sustainable Communities Extension Specialist
Utah State University

Roslynn Brain is an Assistant Professor, Sustainable Communities Extension Specialist at Utah State University. Her expertise lies in using behavioral theory to explain and predict human pro environmental behaviors, then applying social marketing to foster sustainable behavior. Her focal areas include, but are not limited to, recycling, buy-local initiatives, and land conservation.

Kelsey Hall
Utah State University

Dr. Kelsey Hall is an assistant professor of agricultural communication and journalism at Utah State University. As part of her research, she investigates how the knowledge and attitudes an individual possesses in regards to a specific agricultural topic can influence his or her behaviors. Most recently she investigated the marketing strategies used to recruit consumers and retain shareholders of community supported agriculture enterprises in Texas.

Session Description:

Community Supported Agriculture (CSA) benefits, types, steps to getting started, and marketing will be discussed, with a primary focus on social marketing. Specific marketing topics include: various factors to consider when starting a website, blogging, Twitter, Facebook, YouTube, and plenty more! Participants should expect to learn new ideas and ways to promote their farm and products.

Tax Management Issues

Biographical Information:

Ruby Ward
Utah State University

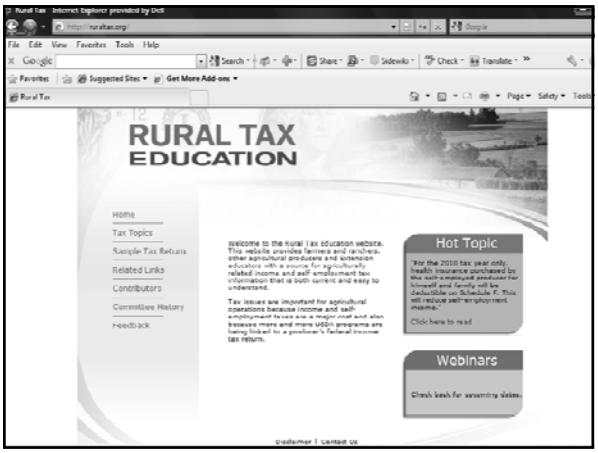
Dr. Ruby Ward was raised on a farm and ranch in South-eastern Idaho. After graduating from Ricks College, she received a BS in Agricultural Economics and Accounting from Utah State University. From Texas A&M University she received an MBA and a PhD in Agricultural Economics. Dr. Ward joined the faculty at Utah State University in 1998 and was tenured in 2005. Ward is currently an associate professor and extension specialist at Utah State University in the Department of Applied Economics. Her current assignment involves all three areas emphasized at a land grant University—teaching, research and extension. She teaches agricultural finance and community planning. Ward is the committee chair for the Diversified Agricultural Conference. Ward is the project leader for the Rural Tax Education website and Co-chair of the National Farm Income Tax Extension Committee. Ward works primarily in the area of rural development focusing on regional economics and agriculture entrepreneurship.

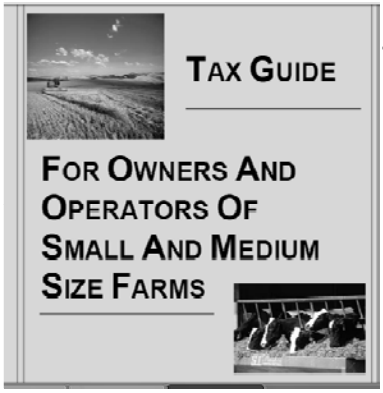
Session Description:

There are many tax laws set to expire at the end of 2012. This session will talk about the current laws and what might change. It will also cover some farm tax basics and go over issues with the timing of taxable income. Farm taxes are paid on a cash basis, meaning that income is not taxable until the product is sold and expenses are deductable when paid. This provides some flexibility in the timing of the income tax paid. This will be discussed using an illustrative example. There will be time for questions and answers on this and other tax concerns.

Tax Management Issues 2012

Ruby Ward





.org

RURAL TAX EDUCATION

www.RuralTax.org

August 2011 RTE/2011-27

Net Operating Losses*

Philip E. Harris, Professor
Department of Agricultural and Applied Economics, University of Wisconsin-Madison

Introduction

Weather, disease and variable prices for inputs and commodities cause farmer's income to fluctuate from one year to the next. Farmers can minimize their income tax liability by managing the timing of their income and deductions to keep their taxable income level. In some cases, the leveling technique is not enough to avoid a spike in taxable income or a dip that causes taxable income to go below zero. The tax effect of the spikes can be minimized with income averaging rules. The tax effect of the dips below zero can be managed with the net operating loss (NOL) rules discussed in this fact sheet.

The concept of the NOL rules is quite simple. Taxpayers are allowed to carry business losses from the loss year to offset taxable income in other tax years. The loss can be carried back and/or forward.

Deferred Tax on Current Assets

- Current liability to account for timing of payment of tax liability.
- Tax that is deferred into a future year from:
  - Delaying selling of crops or livestock produced
  - Prepayment of expenses
  - Accelerating depreciation expense
- Take value of all current assets that would be taxed if sold/collected and subtract all current liabilities that would be deductions if paid.
- The net multiplied by tax rate is deferred tax on current assets.

Balance Sheet
As of December 31, 2011

ASSETS - Current Assets	
Cash	2,000
Accounts receivable	20,000
Feeder Livestock	66,725
Crops and Feed Inventory	85,000
Prepaid Expenses	15,000
Supplies	1,100
Cash invest growing crops	0
Total Current Assets	**189,825**
LIABILITIES - Current Liabilities	
Accounts payable	60000
Notes Payable	70000
Accrued interest	1,500
Current portion term debt	15,000
Accrued Tax	4000
Income tax payable	1000
Deferred tax on current assets	
Total Current Liabilities	**151,500**

Balance Sheet
As of December 31, 2011

ASSETS - Current Assets	
Cash	2,000
Accounts receivable	20,000
Feeder Livestock	66,725
Crops and Feed Inventory	85,000
Prepaid Expenses	15,000
Supplies	1,100
Cash invest growing crops	0
Total Current Assets	**189,825**
LIABILITIES - Current Liabilities	
Accounts payable	60,000
Notes Payable	70,000
Accrued interest	1,500
Current portion term debt	15,000
Accrued Tax	4,000
Income tax payable	1,000
Deferred tax on current assets	
Total Current Liabilities	**151,500**

There are $187,825 of taxable income if it was sold

Balance Sheet
As of December 31, 2011

ASSETS - Current Assets	
Cash	2,000
Accounts receivable	20,000
Feeder Livestock	66,725
Crops and Feed Inventory	85,000
Prepaid Expenses	15,000
Supplies	1,100
Cash invest growing crops	0
Total Current Assets	**189,825**
LIABILITIES - Current Liabilities	
Accounts payable	60,000
Notes Payable	70,000
Accrued interest	1,500
Current portion term debt	15,000
Accrued Tax	4,000
Income tax payable	1,000
Deferred tax on current assets	
Total Current Liabilities	**151,500**

There are $187,825 of taxable income if it was sold

There are $65,500 of deductions if they were paid.

Calculating Deferred tax

- $187,825 income if sold.
- $65,500 deductions/expense if paid
- $122,325 Net taxable income deferred
- Multiply by tax rate (30%)
  - Income tax (10%) + Self Employment tax (15%) + state tax (5%)
- $36,698 of deferred tax liability

Balance Sheet
As of December 31, 2011

ASSETS - Current Assets	
Cash	2,000
Accounts receivable	20,000
Feeder Livestock	66,725
Crops and Feed Inventory	85,000
Prepaid Expenses	15,000
Supplies	1,100
Cash invest growing crops	0
Total Current Assets	**189,825**
LIABILITIES - Current Liabilities	
Accounts payable	60,000
Notes Payable	70,000
Accrued interest	1,500
Current portion term debt	15,000
Accrued Tax	4,000
Income tax payable	1,000
Deferred tax on current assets	36,698
Total Current Liabilities	**188,198**

Deferred Tax cont.

- Reasons to do it:
  - Keeps farmer in a lower tax bracket
  - Keeps farmer from paying AMT tax.
  - If the tax is the same dollars, paying it in the future is cheaper (you are using deflated dollars to do so). You could also have made money on the investment.
- Reasons not to do it:
  - Risk involved, it may hit the farmer at a time they are financially unable to cover it.
  - May be higher tax rates in the future.

Tax rates 2012 and 2013

- The top individual income tax rate would remain at 35 percent in 2012 will go to 39.6% in 2013.
- The rate for capital gains and dividends would stay at 15 percent through 2012 and go to 20% in 2013.
  - Go from 0% to 10% for low income earners.
- In 2013 added 3.8% for investment income for high income earners (jointly filing income > $250K).
- In 2013 added .9% for wages in excess of $250K (married or $200K single).

FICA TAX

- The employer portion of the FICA tax remains at 6.2 percent
- Employee portion will be 4.2 percent on earned wages up to $18,350 – Through end of Feb. 2012, but was extended in Feb.
- This means that self employment tax will also remain at 13.3% (2% lower).

Section 179 Election For Expensing Equipment

- In 2012, expense method depreciation (for federal tax purposes) would be set at $139,000, with the phase-out beginning at $560,000 of qualified property purchases for the year. Without subsequent legislation, the limit will fall to $25,000 (adjusted for inflation) beginning in 2013.

Additional First year Depreciation

- The bill specifies that for qualified assets (original use of the asset by the taxpayer) placed in service by December 31, 2012, 50 percent bonus depreciation is available.

Current Extension - Estate Taxes

- For deaths and taxable transfers in 2011 and 2012
  - The exemption for estate, gift and GSTT purposes would be $5 million ($5.12 million in 2012) and the tax rate would be 35 percent beyond that level.
  - The bill would also allow portability of the estate tax exemption between spouses for deaths in 2011 and 2012. So, the new applicable exclusion amount is the basic exclusion amount plus the portable amount carried over from the decedent's last spouse.
- In 2013, the exclusion will be $1 million and the tax rate will be 55 percent unless the Congress takes action.

Department of the Treasury — Internal Revenue Service (99)

Form 1040 U.S. Individual Income Tax Return 2011

OMB No. 1545-0074 | IRS Use Only — Do not write or staple in this space.

For the year Jan 1 - Dec 31, 2011, or other tax year beginning , 2011, ending , 20 | See separate instructions.

Your first name MI Last name: William F Rosso	Your social security number: 543-00-2111
If a joint return, spouse's first name MI Last name: Barbara J Rosso	Spouse's social security number: 543-00-1222
Home address (number and street). If you have a P.O. box, see instructions. Apartment no.: 4427 East Lake Road	▲ Make sure the SSN(s) above and on line 6c are correct.
City, town or post office. If you have a foreign address, also complete spaces below (see instructions). State ZIP code: Wilson, NY 14172	**Presidential Election Campaign** Check here if you, or your spouse if filing jointly, want $3 to go to this fund? Checking a box below will not change your tax or refund. ☐ You ☐ Spouse
Foreign country name / Foreign province/county / Foreign postal code	

Filing Status

Check only one box.

1 ☐ Single
2 ☒ Married filing jointly (even if only one had income)
3 ☐ Married filing separately. Enter spouse's SSN above & full name here ►
4 ☐ Head of household (with qualifying person). (See instructions.) If the qualifying person is a child but not your dependent, enter this child's name here ►
5 ☐ Qualifying widow(er) with dependent child

Exemptions

6a ☒ **Yourself.** If someone can claim you as a dependent, **do not** check box 6a
b ☒ **Spouse**

Boxes checked on 6a and 6b: 2

No. of children on 6c who:
- lived with you:
- did not live with you due to divorce or separation (see instrs):

Dependents on 6c not entered above:

Add numbers on lines above ►: 2

c Dependents:

(1) First name Last name	(2) Dependent's social security number	(3) Dependent's relationship to you	(4) ✓ if child under age 17 qualifying for child tax cr (see instrs)
			☐
			☐
			☐
			☐

If more than four dependents, see instructions and check here ► ☐

d Total number of exemptions claimed

Income

Attach Form(s) W-2 here. Also attach Forms W-2G and 1099-R if tax was withheld.

If you did not get a W-2, see instructions.

Enclose, but do not attach, any payment. Also, please use Form 1040-V.

7	Wages, salaries, tips, etc. Attach Form(s) W-2	7	10,908.
8a	**Taxable** interest. Attach Schedule B if required	8a	595.
b	**Tax-exempt** interest. **Do not** include on line 8a. 8b		
9a	Ordinary dividends. Attach Schedule B if required	9a	
b	Qualified dividends. 9b		
10	Taxable refunds, credits, or offsets of state and local income taxes	10	
11	Alimony received	11	
12	Business income or (loss). Attach Schedule C or C-EZ	12	
13	Capital gain or (loss). Att Sch D if reqd. If not reqd, ck here ► ☐	13	-1,224.
14	Other gains or (losses). Attach Form 4797	14	1,175.
15a	IRA distributions 15a b Taxable amount	15b	
16a	Pensions and annuities 16a b Taxable amount	16b	
17	Rental real estate, royalties, partnerships, S corporations, trusts, etc. Attach Schedule E	17	
18	Farm income or (loss). Attach Schedule F	18	63,792.
19	Unemployment compensation	19	
20a	Social security benefits 20a b Taxable amount	20b	
21	Other income	21	
22	Combine the amounts in the far right column for lines 7 through 21. This is your **total income** ►	22	75,246.

Adjusted Gross Income

23	Educator expenses	23	
24	Certain business expenses of reservists, performing artists, and fee-basis government officials. Attach Form 2106 or 2106-EZ	24	
25	Health savings account deduction. Attach Form 8889	25	
26	Moving expenses. Attach Form 3903	26	
27	Deductible part of self-employment tax. Attach Schedule SE	27	4,506.
28	Self-employed SEP, SIMPLE, and qualified plans	28	
29	Self-employed health insurance deduction	29	7,042.
30	Penalty on early withdrawal of savings	30	
31a	Alimony paid b Recipient's SSN ►	31a	
32	IRA deduction	32	
33	Student loan interest deduction	33	
34	Tuition and fees. Attach Form 8917	34	
35	Domestic production activities deduction. Attach Form 8903	35	5,733.
36	Add lines 23 through 35	36	17,281.
37	Subtract line 36 from line 22. This is your **adjusted gross income** ►	37	57,965.

Tax and Credits	38	Amount from line 37 (adjusted gross income)	38	57,965.
	39a	Check if: ☐ You were born before January 2, 1947, ☐ Blind. ☐ Spouse was born before January 2, 1947, ☐ Blind. Total boxes checked ► 39a		
	b	If your spouse itemizes on a separate return or you were a dual-status alien, check here ► 39b ☐		
Standard Deduction for – • People who check any box on line 39a **or** 39b or who can be claimed as a dependent, see instructions. • All others: Single or Married filing separately, $5,800 Married filing jointly or Qualifying widow(er), $11,600 Head of household, $8,500	40	**Itemized deductions** (from Schedule A) **or** your **standard deduction** (see instructions)	40	15,000.
	41	Subtract line 40 from line 38	41	42,965.
	42	**Exemptions.** Multiply $3,700 by the number on line 6d	42	7,400.
	43	**Taxable income.** Subtract line 42 from line 41. If line 42 is more than line 41, enter -0-	43	35,565.
	44	**Tax** (see instrs). Check if any from: a ☐ Form(s) 8814 c ☐ 962 election b ☐ Form 4972	44	3,556.
	45	**Alternative minimum tax** (see instructions). Attach Form 6251	45	0.
	46	Add lines 44 and 45 ►	46	3,556.
	47	Foreign tax credit. Attach Form 1116 if required 47		
	48	Credit for child and dependent care expenses. Attach Form 2441 48		
	49	Education credits from Form 8863, line 23 49		
	50	Retirement savings contributions credit. Attach Form 8880 50		
	51	Child tax credit (see instructions) 51		
	52	Residential energy credits. Attach Form 5695 52		
	53	Other crs from Form: a ☐ 3800 b ☐ 8801 c ☐ 53		
	54	Add lines 47 through 53. These are your **total credits**	54	
	55	Subtract line 54 from line 46. If line 54 is more than line 46, enter -0- ►	55	3,556.
Other Taxes	56	Self-employment tax. Attach Schedule SE	56	7,835.
	57	Unreported social security and Medicare tax from Form: a ☐ 4137 b ☐ 8919	57	
	58	Additional tax on IRAs, other qualified retirement plans, etc. Attach Form 5329 if required	58	
	59a	Household employment taxes from Schedule H	59a	
	b	First-time homebuyer credit repayment. Attach Form 5405 if required	59b	
	60	Other taxes. Enter code(s) from instructions	60	
	61	Add lines 55-60. This is your **total tax** ►	61	11,391.
Payments If you have a qualifying child, attach Schedule EIC.	62	Federal income tax withheld from Forms W-2 and 1099 62 1,435.		
	63	2011 estimated tax payments and amount applied from 2010 return 63		
	64a	**Earned income credit (EIC)** No 64a		
	b	Nontaxable combat pay election ► 64b		
	65	Additional child tax credit. Attach Form 8812 65		
	66	American opportunity credit from Form 8863, line 14 66		
	67	First-time homebuyer credit from Form 5405, line 10 67		
	68	Amount paid with request for extension to file 68		
	69	Excess social security and tier 1 RRTA tax withheld 69		
	70	Credit for federal tax on fuels. Attach Form 4136 70 350.		
	71	Credits from Form: a ☐ 2439 b ☐ 8839 c ☐ 8801 d ☐ 8885. 71		
	72	Add lns 62, 63, 64a, & 65-71. These are your **total pmts** ►	72	1,785.
Refund Direct deposit? See instructions.	73	If line 72 is more than line 61, subtract line 61 from line 72. This is the amount you **overpaid**	73	
	74a	Amount of line 73 you want **refunded to you.** If Form 8888 is attached, check here ► ☐	74a	
	b	► Routing number ► c Type: ☐ Checking ☐ Savings		
	d	► Account number		
	75	Amount of line 73 you want **applied to your 2012 estimated tax** ► 75		
Amount You Owe	76	**Amount you owe.** Subtract line 72 from line 61. For details on how to pay see instructions ►	76	9,606.
	77	Estimated tax penalty (see instructions) 77		

Third Party Designee Do you want to allow another person to discuss this return with the IRS (see instructions)? ☐ **Yes.** Complete below. ☒ **No**

Designee's name ► Phone no. ► Personal identification number (PIN) ►

Sign Here Joint return? See instructions. Keep a copy for your records.

Under penalties of perjury, I declare that I have examined this return and accompanying schedules and statements, and to the best of my knowledge and belief, they are true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Your signature	Date	Your occupation	Daytime phone number
		Farmer	
Spouse's signature. If a joint return, both must sign.	Date	Spouse's occupation	If the IRS sent you an Identity Protection PIN, enter it here (see inst)
		Farm Wife	

Paid Preparer's Use Only

Print/Type preparer's name	Preparer's signature	Date	Check ☐ if self-employed	PTIN
	Self-Prepared			

Firm's name ► Firm's address ► Firm's EIN ► Phone no.

SCHEDULE F (Form 1040)

Department of the Treasury Internal Revenue Service (99)

Profit or Loss From Farming

► Attach to Form 1040, Form 1040NR, Form 1041, Form 1065, or Form 1065-B.
► See Instructions for Schedule F (Form 1040).

OMB No. 1545-0074

2011

Attachment Sequence No. 14

Name of proprietor	Social security number (SSN)
William F Rosso	543-00-2111

A Principal crop or activity	B Enter code from Part IV	C Accounting method:	D Employer ID number (EIN), (see instr)
Milk	► 112120	[X] Cash [ ] Accrual	91-1234567

E Did you 'materially participate' in the operation of this business during 2011? If 'No,' see instructions for limit on passive losses . . . [X] Yes [ ] No

F Did you make any payments in 2011 that would require you to file Form(s) 1099 (see instructions)? . . . [X] Yes [ ] No

G If 'Yes,' did you or will you file all required Forms 1099? . . . [X] Yes [ ] No

Part I Farm Income — Cash Method. Complete Parts I and II (Accrual method. Complete Parts II & III, & Part I, line 9.)

1a	Specified sales of livestock and other resale items (see instructions)	1a			
b	Sales of livestock and other resale items not reported on line 1a	1b	13,596.		
c	Total of lines 1a and 1b (see instructions)	1c	13,596.		
d	Cost or other basis of livestock or other items reported on line 1c	1d	6,523.		
e	Subtract line 1d from line 1c			1e	7,073.
2a	Specified sales of products you raised (see instructions)			2a	
b	Sales of products you raised not reported on line 2a			2b	263,018.
3a	Cooperative distributions (Form(s) 1099-PATR)	3a	1,145.	3b Taxable amount	3b 1,145.
4a	Agricultural program payments (see instructions)	4a	6,781.	4b Taxable amount	4b 6,781.
5a	Commodity Credit Corporation (CCC) loans reported under election			5a	665.
b	CCC loans forfeited	5b		5c Taxable amount	5c
6	Crop insurance proceeds and federal crop disaster payments (see instructions):				
a	Amount received in 2011	6a		6b Taxable amount	6b
c	If election to defer to 2012 is attached, check here ► [ ]			6d Amount deferred from 2010	6d
7a	Specified custom hire (machine work) income (see instructions)			7a	
b	Custom hire income not reported on line 7a			7b	1,258.
8a	Specified other income (see instructions)			8a	
b	Other income not reported on line 8a (see instructions)			8b	142.
9	**Gross income.** Add amounts in the right column (lines 1e, 2a, 2b, 3b, 4b, 5a, 5c, 6b, 6d, 7a, 7b, 8a, and 8b). If you use the accrual method, enter the amount from Part III, line 50 (see instructions) ►			9	280,082.

Part II Farm Expenses — Cash and Accrual Method. Do not include personal or living expenses (see instrs).

10	Car and truck expenses (see instructions). Also attach **Form 4562**	10	1,090.	23 Pension and profit-sharing plans	23
11	Chemicals	11	8,055.	24 Rent or lease (see instructions):	
12	Conservation expenses (see instructions)	12	6,781.	a Vehicles, machinery, equipment	24a
13	Custom hire (machine work)	13	3,879.	b Other (land, animals, etc)	24b 9,660.
14	Depreciation and section 179 expense (see instructions)	14	33,705.	25 Repairs and maintenance	25 13,504.
15	Employee benefit programs other than on line 23	15		26 Seeds and plants	26 5,872.
16	Feed	16	50,814.	27 Storage and warehousing	27
17	Fertilizers and lime	17	6,544.	28 Supplies	28 7,433.
18	Freight and trucking	18	2,906.	29 Taxes	29 3,201.
19	Gasoline, fuel, and oil	19	6,216.	30 Utilities	30 5,504.
20	Insurance (other than health)	20	3,362.	31 Veterinary, breeding, and medicine	31 8,508.
21	Interest:			32 Other expenses (specify):	
a	Mortgage (paid to banks, etc)	21a	3,175.	a Dues, commissions, fees	32a 347.
b	Other	21b	7,738.	b Milk assessments	32b 807.
22	Labor hired (less employment credits)	22	26,368.	c Office expense	32c 287.
				d Travel & meals	32d 534.
				e	32e
				f	32f

33	**Total expenses.** Add lines 10 through 32f. If line 32f is negative, see instructions ►	33	216,290.
34	**Net farm profit or (loss).** Subtract line 33 from line 19	34	63,792.

If a profit, stop here and see instructions for where to report. If a loss, complete lines 35 and 36.

35 Did you receive an applicable subsidy in 2011? (see instructions) . . . [X] Yes [ ] No

36 Check the box that describes your investment in this activity and see instructions for where to report your loss.

a [ ] All investment is at risk b [ ] Some investment is not at risk

Ideas for Agriculture Tourism: Developing Tourism Resources on the Farm or Ranch

Biographical Information:

Steven Burr
Institute for Outdoor Recreation and Tourism
Utah State University

Dr. Steve Burr is an Associate Professor of Recreation Resources Management, Director of the Institute for Outdoor Recreation and Tourism, and Extension Specialist in Outdoor Recreation and Tourism in the Department of Environment and Society in the College of Natural Resources at Utah State University. After receiving a M.S. in Recreation and Park Management from the University of Oregon in 1977, with an emphasis on organized camping administration and outdoor education, Steve worked professionally for over fifteen years in outdoor education, outdoor leadership training, program development, and organized camping administration for both the YMCA and Outward Bound. He received a Ph.D. in 1994 in Recreation, Parks, and Leisure Studies from Penn State University. He then served on the faculty of Western Illinois University's Department of Recreation, Parks, and Tourism Administration for six years, prior to arriving at Utah State University in 1999.

In Utah, Steve served for six years on the Governor's Office of Economic Development—Utah Office of Tourism's Board of Directors and is still the Board's liaison to the Utah Council for Outdoor Recreation (UCOR), which he chairs. He also serves as Vice-President for Education on the Friends of Utah State Parks Board, serves on the Bear River Heritage Area Executive Council, and serves on the Grand Staircase-Escalante National Monument Advisory Committee, which he chairs, representing social sciences with expertise in outdoor recreation and tourism, and community development. Steve was recently appointed by Secretary of Interior Salazar to the BLM-Utah Resource Advisory Council representing dispersed recreation, tourism, and community development.

Session Description:

This session will give a general and introductory overview of agricultural tourism focusing on the following points:

- Agricultural Diversification and Agricultural Tourism
- Niche Markets and Providing Services for a Visiting Public
- Value Added Products, Services, and Experiences

- Continuing and Emerging Tourism Trends
- Developing a Quality Package of Activities and Experiences for Visitors
- Oregon Ranchers Diversifying into Agritourism
- Critical Elements for Ag-Tourism Operators
- Cooperation and Collaboration
- Agritourism Resources
- Some Case Studies in Ag-Tourism

Caneberries: Novel Production Techniques and New Varieties

Biographical Information:

Ellen Thompson
Pacific Berry Breeding, LLC

Ellen Thompson is an alumna of the University of Arkansas and Oregon State University. Her background is in primocane-fruiting blackberry production and management, a relatively new crop in the world of caneberries. She currently works for Pacific Berry Breeding, LLC as the Research Director for their raspberry breeding program. Her interests include precision agriculture, plant nutrition and soil fertility.

Session Description:

This presentation will cover the most creative techniques observed in the caneberry industry to overcome challenges such as UV damage, winter injury, problematic soils, and color reversion in blackberries. Main topics will include the Rotating Cross Arm (RCA) trellis system in blackberries, methods to advance/delay your caneberry crop, ways to reduce color reversion (in blackberries) and minimize darkening (in raspberries), as well as alternative production and management methods for raspberries. The presentation will also talk about new publicly-available caneberry varieties.

New Online Resources for Crop Management

Biographical Information:

Brent Black
Utah State University

Dr. Brent Black is an Associate Professor and Extension Fruit Specialist at Utah State University in Logan Utah. Prior to joining USU in 2005 he was a Research Horticulturist with the USDA Agriculture Research Service in Beltsville, Maryland. A native of southeastern Idaho, Brent completed his undergraduate degree in Plant and Soil Science at USU, a Masters degree in Horticulture at Michigan State University, and a Ph.D. in Plant Physiology at Oregon State University. In graduate school, he studied plant growth regulators and fruit thinning in apple, as well as tree nitrogen metabolism. While at USDA, he studied management systems and practices for strawberry, raspberry and blueberry. His current interests include high-tunnel berry crop production, tart cherry orchard systems, orchard irrigation management, and alternative crops for small acreage diversification.

Marion Murray
Utah State University

Marion has been the IPM Project Leader at Utah State University Cooperative Extension, Logan, since 2006. She conducts Extension outreach and research in integrated pest management and distributes weekly pest advisories for tree fruits, landscape ornamentals, and vegetables. Prior to coming to USU, she spent 10 years in public horticulture education and landscape management. She received her Master's degree in plant pathology from Oregon State University and undergraduate degree at Penn State University. She is originally from North Carolina.

Session Description:

This session will present online resources for weather and pest information.

Restaurant Supporting Local Agriculture

Biographical Information:

Ryan Lowder
The Copper Onion

Home-grown Utahn Ryan Lowder recognized his true passion for food when he moved to Portland, Oregon. Without formal culinary training, he apprenticed under French-trained chef Lisa Schroeder of the critically-acclaimed Mother's Bistro. Inspired by that experience, Ryan decided to enroll at the Culinary Institute of America in New York. While attending the CIA, Ryan landed an externship at Restaurant Jean-Georges, which turned into a full time position. It was at Jean-Georges that Ryan's skills were fine-tuned, as he worked his way through the kitchen's stations. During Ryan's tenure as Chef de Partie the Michelin guide awarded the restaurant 3 stars—the highest rating offered by the guide.

Then it was time to travel. In Colombia, Ryan consulted for one of the country's top restaurants, Club Colombia, before heading to Barcelona. While living in the trendy "Born" district, Ryan ran the catering company "Born Cooking" and staged at the Michelin starred restaurant El Raco D'En Freixa. When Ryan returned to New York, he put his Spanish culinary knowledge to use at the Batali group's Casa Mono, and then as opening executive chef of the authentic Catalan restaurant, Mercat. After two years at Mercat, Ryan assisted in the design of sister restaurant Mercat Negre before leaving the group to get married to Colleen and travel. In 2009, after a short tenure as consulting executive chef at Gusto Ristorante in Manhattan's West Village, Ryan decided to return to his hometown and apply his culinary training to Salt Lake's rapidly expanding food scene. Ryan's menu reflects his passion for working with seasonal ingredients, showcasing products from the best local farmers and purveyors, as well as international flavors reflective of his time abroad.

Session Description:

This session will discuss how to approach a restaurant and what restaurants want. It will also talk about developing a relationship with restaurants.

Bee Keeping Economics and Marketing

Biographical Information:

Martin James

As a youngster, at the ripe old age of 8, Martin James talked his Mother into attending a class with him at Utah State University on Bee Keeping. Martin and his dad build his first hives so that he could spent the next several years as a hobbyist beekeeper learning all he could about beekeeping. As the years flew by, Martin wanted to take his hobby to the level of a full time Agricultural Operation. Martin's wife, kids, parents, and four siblings all took a part in helping to build 100 hives into 2400 in five short years and still growing. Today you can see Martin and his sister Karla driving down the highway in their Mother's Kenworth Semi-Truck, transporting our Honey Bees to the San Joaquin Valley in California for Pollinating Almonds Trees in January - February then home again in March to unload the Honey Bees into bee yards across northern Utah bringing in a honey crop during the spring & summer months.

Session Description:

Slide Ridge Honey (www.slideridgehoney.com) is a company that not only worries about producing great honey and the health of their hives, they are also engaged in creating products that transform their honey into products unlike any other. They realized that just producing great honey would not be enough to have a sustainable business. They created a honey vinegar out of their honey that has had rave reviews and is now marketed through some Utah stores. This session will not only go over what they do, but also how to think about your business as a business and develop a plan that will work for you.

Example of County Agritourism Regulations

Biographical Information:

Scott Mendoza
Weber County Planning Division

Having an interest in both physical and social sciences, Scott Mendoza chose to study geography and land use planning at Weber State University where he was given the opportunity to combine elements of both science disciplines into one degree. This field of study has enabled Scott to hold employment positions in the private sector as well as city, county and federal levels of government. Past relevant employers consist of a private land survey firm, the US Forest Service, Ogden City Neighborhood Development, Davis County Engineering, and the Weber County Surveyor's Office. Currently, Scott works as a land use planner for Weber County where he primarily focuses on long range planning issues and ordinance development. Scott enjoys the creative outlet and challenge that comes with integrating new and progressive ideas into land use ordinances. Recently, Weber County became the recipient of an *Award of Merit*, from the Utah Chapter of the American Planning Association, for its efforts in crafting and adopting an innovative mountain resort development code.

Session Description:

This session will consist of a presentation of a new (draft) agritourism ordinance that may be utilized in Weber County. The main points of the discussion will consist of a brief explanation of each of the eight sections of the ordinance. The sections include: 1) Definitions, 2) Purpose and Intent, 3) Applicability, 4) General Development Standards, 5) Farm Size Categories, 6) Permitted Activities, 7) Activity Standards and Limitations, and 8) Signs.

Zoning and Other Regulatory Issues in Ag Tourism

Biographical Information:

Sherrie Reeder
Staheli Family Farm

Sherrie and Darrin Reeder and their six children operate a 150-acre farm, which has been in the Staheli family for five generations. Since they opened to the public in 2002, Staheli Family Farm has provided quality family entertainment to 20,000 to 30,000 people per year. With so many people touring the farm, they've actually employed corn cops to keep visitors in line. They continue to add new things to the farm and are proud that it is a real working farm, raising beef cows and alfalfa in addition to being open for family fun and education.

Session Description:

Staheli Family Farm is nestled in what is called "the fields" to local folks. It's surrounded by beautiful alfalfa fields and homes. The Olde Farmhouse was built, along with restrooms, corrals, a food court and more. Today, Staheli Family Farm is a real working farm, raising beef cows and alalfa, in addition to being open for family fun and education.

Sherrie has dealt with many regulatory and zoning issues as what they are doing falls between agriculture zoning and commercial zoning. She will talk about her experiences from an agritourism owner's perspective.

Value-Added Resources

Biographical Information:

Karin Allen
Utah State University

Karin Allen is the food quality & entrepreneurship specialist at Utah State University Extension. Her programs include the development of extension programming to assist small businesses and entrepreneurs with production and processing of quality foods. She also coordinates academic and outreach services of the on-campus Food Innovation Laboratory and Incubator Kitchen. She also helps people meet the labeling requirements to meet State and/or Federal regulations.

Session Description:

Utah State University has many resources available for producers ready to enter the value-added market. Learn more about what value-added is, what your processing options are, and where to find help along the way.

Value-Added Products

Issues & Resources

U.S.U. Extension Food Quality & Entrepreneurship
Karin Allen, Ph.D.

9th Annual Diversified Agriculture Conference
February 23, 2012

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extension.usu.edu

What is *Value-Added*?

- The difference between the sale price of a product and the cost of materials to produce it
- Enhancements added to a product before it is offered for sale to consumers
- *Anything* you can do to raise the value of your product in the market

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Value-Added Foods

- Local, organic, vine-ripened, or specialty crops
- "Gourmet" foods
  - Jams, jellies, preserves
  - Pickled vegetables
  - Hot sauces, salsas, tapenades
  - Herbed oils and vinegars
- Must consider safety and labeling issues

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Farmer's Markets & Stands

- Do not require registration with UDAF
- Only fresh, raw, whole, unprocessed foods

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Outdoor Markets & Stands

- Market & vendors must register with UDAF
- Can sell most types of processed foods

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Processing Options:
Cottage Food Production

- Home kitchen, certified by UDAF
  - No pets
  - Separate storage
  - Food handler's permit
- Must state "Home Produced" on label
- Cannot sell to restaurants or other food establishments

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Allowed Cottage Foods

- Air cooled hard boiled eggs (shell intact)
- Foods with Aw ≤ 0.85
- Foods with pH ≤ 4.6
- Properly canned acid foods
- Other foods deemed non-hazardous

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Processing Options:
Certified Food Establishments

- Commercial facility, State / Local certification
  - Incubator kitchens, restaurant kitchens
- Potentially Hazardous Foods can be produced, but must be approved
- Can sell to restaurants, food establishments
- Must meet general labeling requirements

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Processing Options:
Contract Packaging – "Co-Packers"

- Certified food production facilities
  - Will package your product in their down-time
- Each co-packer has different requirements, capabilities & minimum runs
- Can sell to restaurants, food establishments
- Must meet general labeling requirements

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- Regulatory Questions
- Food Business Start-Up
- Labeling & Nutrition Facts Panels
- Safety Testing for Cottage Industry Products
- Packaging & Ingredient Sourcing
- Incubator Kitchen

FOOD QUALITY & ENTREPRENEURSHIP
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- Product Testing & Safety Validation
- Process Validation
- HACCP Plan Development
- HACCP/ServSafe Training
- Innovation Kitchen

USU EXTENSION
FOOD SAFETY EDUCATION

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UDAF Certification Resources

- Cottage Production Certification
  Rebecca Nielson, (801)538-7152
- Food Establishment Certification
  Jay Schvaneveldt, (801) 538-7149
- Organic Certification
  Ron Larsen, (801)538-7187

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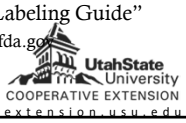
Food Safety Resources

- U.S.U. Extension Food Safety
  Brian Nummer, PhD, (435)797-2116
  brian.nummer@usu.edu
- FDA Food Code
  Search "FDA food code" at www.fda.gov
- Food Safety portal
  www.FoodSafety.gov

Labeling Resources

- U.S.U. Food Quality & Entrepreneurship
  Karin Allen, PhD, (435)797-1768
  karin.allen@usu.edu
- UDAF Labeling Compliance
  Rebecca Nielsen, rjnielsen@utah.gov, (801)860-7075
- "Guidance for Industry: A Food Labeling Guide"
  Search "Food Labeling Guide" at www.fda.gov
  e-mail Karin Allen for pdf version



Questions?

Involving the Public in Cultivar Evaluation Research

Biographical Information:

Britney Hunter
Utah State University Extension

Britney grew up in Salt Lake City, Utah. She graduated with a B.S. in Horticulture from Utah State University in 2007. As an undergraduate she worked at a plant nursery and assisted some of USU's outstanding Extension Specialists, which inspired her interest in Extension. She earned a M.S. in Plant Science from Utah State University in 2010. Her graduate research involved cold temperature protection for vegetable crops grown in high tunnels to achieve out-of-season production. After some valuable internship experiences in student government, marketing, garden consulting, and youth education, she became the Davis County USU Horticulture Extension Agent in 2011.

Session Description:

Regional cultivar trials are useful for evaluating adaptability to climate and soil conditions, and typically compare yield, fruit size, and disease resistance. Comparing subjective traits such as aesthetic and flavor characteristics can be difficult, but these characteristics are key to direct-market producers and home gardeners. The results from several taste tests will be discussed, which included 37 cultivars of raspberry and blackberry from a research trial at the USU Botanical Center.

Report of a 4-Year Raspberry Cultivar Trial

Biographical Information:

Brent Black
Utah State University

Dr. Brent Black is an Associate Professor and Extension Fruit Specialist at Utah State University in Logan Utah. Prior to joining USU in 2005, he was a Research Horticulturist with the USDA Agriculture Research Service in Beltsville, Maryland. A native of southeastern Idaho, Brent completed his undergraduate degree in Plant and Soil Science at USU, a Masters degree in Horticulture at Michigan State University, and a Ph.D. in Plant Physiology at Oregon State University. In graduate school, he studied plant growth regulators and fruit thinning in apple, as well as tree nitrogen metabolism. While at USDA, he studied management systems and practices for strawberry, raspberry and blueberry. His current interests include high-tunnel berry crop production, tart cherry orchard systems, orchard irrigation management, and alternative crops for small acreage diversification.

Session Description:

27 raspberry varieties were evaluated from 2006 to 2011 at the Kaysville Research Farm. 10 varieties were fall bearing and 17 summer bearing. Comparisons were made of yield, production season, fruit size and quality, flavor preference, and susceptibility to raspberry horntail. Results will be presented.

Urban Farming Programs at Utah Department of Agriculture including Utah's Own

Biographical Information:

Seth R. Winterton
Utah Department of Agriculture and Food

Seth Winterton is the Deputy Director of Marketing at the Utah Department of Agriculture and Food. Emphasis is placed on Utah's Own, a state branding program, but other interests include alternative marketing methods for agriculturally produced and value added processed products. Seth helped develop the Utah organic regulation and managed that program. He has a strong knowledge of organic agriculture and has worked with other state and private organic certification agencies as the President of the National Association of State Organic Programs. His work with the state included agriculture investigations, administrative law case development, predator control and meat inspection.

The family business growing up included a registered Hereford operation, of which Seth was involved. After graduation from college, he managed a beef ranch and horse breeding farm. He lives on a small ranching operation and operates a destination fly fish guiding service on the Upper Provo River. He is a seasoned auctioneer.

Seth holds a Bachelor of Science degree in Animal Science from Utah State University and a Masters of Business Administration (MBA), with marketing emphasis from the University of Phoenix.

Session Description:

The Utah Department of Agriculture and Food is continuing to expand its work with urban farm issues. The Utah's Own program has long understood and promoted the importance of locally grown food. Utah's Own is working with a growing number of urban farmers as a means to educate the larger Wasatch Front population about the connection between their food and the farm. This session will cover how UDAF is currently working with Urban Agriculture to help with the unique needs of this sector of Utah Agriculture as well as what it sees as the needs of urban farmers and the role that UDAF and others can take in support of urban farming.

Market and Pricing Opportunities for Extended Season Sales

Biographical Information:

Kynda Curtis
Utah State University

Dr. Kynda Curtis is an Associate Professor and Extension Agricultural and Food Marketing Specialist at Utah State University. Dr. Curtis works with agricultural producers to assist them in developing new markets for their products and assessing the feasibility of new food and agricultural products and value-added processes.

Session Description:

This session will discuss the market and pricing potential for extended season (winter, early spring, late fall) direct market sales of local food products. Extended direct market opportunities and pricing trends will be discussed, as well as potential hurdles. The session will provide agricultural producers with valuable information regarding potential revenue estimates which may be used to assess the financial impacts of implementing season extension techniques into their operation.

Tourism Programs- How Can They Help Agritourism Marketing

Biographical Information:

Leigh von der Esch
Utah Office of Tourism

Leigh von der Esch was named managing director of the Utah Office of Tourism in May of 2005. Prior to that appointment, von der Esch was the State Film Commissioner from 1985 to 2005. As President of the Association of Film Commissioners International (AFCI) from 1990 to 1996, von der Esch spoke of the State's film industry and AFCI in countries around the world on the economic and tourism benefits of movies shooting on location. As managing director of the Utah Office of Tourism, von der Esch is a member of US Travel Industry Association and is a member of the National Council of State Tourism Directors and board of director's member, as well as Chair of the Western States Tourism Policy & Lands Council. She has been honored by Utah Business Magazine on several occasions in Utah for 100 top leaders in Utah for business. Von der Esch is a graduate of the University of Utah with honors, with a bachelor's degree in political science.

Julie Hollist
Cache Valley Visitors Bureau

Julie Hollist loves her position as director of the Cache Valley Visitors Bureau in Logan. She is also a professional writer, editor, and marketer for regional, national, and international companies. She taught writing for public relations as an adjunct professor at Utah State University for three years and graduated magna cum laude with her master's degree in communication from Utah State University. She loves to travel and you're just as likely to find her at the rodeo as at the opera. She loves all kinds of new adventures as long as they don't involve sewing or hot glue.

Session Description:
This first half of the session will focus on answering the question, what is the Utah Office of Tourism and its partners doing to promote Utah Agritourism? You will also learn what programs are available to help you market and tips for successful marketing and positioning your business as Agritourism.

This session will also focus on the development, challenges, and success of the Cache Valley Food Tour.

Weed Management

Biographical Information:

Ralph Whitesides
Utah State University

Ralph Whitesides received a MS and a PhD from Oregon State University in Crop Science with an emphasis in Weed Science. His current research interests include production of alternative sources of fuel by evaluating oilseed crop production on non-traditional agronomic land, the long-term musk thistle control through herbicide spot treatment, small acreage-pasture management, and statewide Extension weed management. He is actively researching the possibility of producing oilseed crops such as canola and safflower on roadside rights-of-way, military land, airports, and on city and county owned land that is sitting idle.

Session Description:

This session will cover various weed management issues for berry production in Utah. It will talk about the major things to look for as well as how to manage them.

Pollinator Enhancement and Integrated Pest Management: How Planning and Managing Invertebrates Can Benefit Your Farm and the Environment

Biographical Information:

Katie Wagner
USU Extension, Salt Lake County

Katie grew up in Lexington, Kentucky where she attended the University of Kentucky and was a member of the Environmental Soil Chemistry Lab under the direction of Dr. Chris Matocha. She completed a B.S. in Topical Studies: Environmental Science and Policy and a M.S. in Plant and Soil Sciences. Katie moved to Utah in 2006 and completed a B.S. in Ornamental Horticulture from Utah State University in 2009. She has worked for several local horticultural businesses including Millcreek Gardens, Cactus and Tropicals, and Isalo Garden Design. Katie is currently employed by Utah State University Cooperative Extension as an Extension Assistant Professor of Horticulture in Salt Lake County.

Session Description:

This presentation will address application of Integrated Pest Management (IPM) practices for the protection and promotion of pollinators. Good land management practices, identification and protection of pollinator habitat, and pollinator plantings will be highlighted along with resources for landowners interested in creating their own pollinator havens.

New Product Marketing and Branding Your Product

Biographical Information:

Susan and Stig Hansen
Snowy Mountain Sheep Creamery

Snowy Mountain Sheep Creamery is Utah's first dairy sheep operation based in Eden, Utah. We began in the fall of 2009 acquiring a flock of dairy sheep from Dancing Lambs Farm in New York State. Artisan Cheese Making began after parlor and manufacturing plant installation, approvals and licensing in August of 2010. We milk 150 head of French lacaune, East Freesian and Icelandic sheep breeds. One hundred percent of the milk is made into seven varieties of specialized handcrafted cheeses sold in Utah, New York, Colorado, California, Nevada and Washington states. Our "other" products include fabulous fleeces, and delicate pasture raised lamb. Agri-tourism is fast becoming a new facet of our business that will be discussed in our marketing and branding presentation.

Susan:
Susan Hansen is a Pennsylvania born native. She was raised in the heart of cow dairy country where her family owned and operated two cow dairy operations. She was determined to never have anything to do with the businesses again and went off to college to pursue her career in music. She attended Susquehanna and Mansfield Universities. She studied and performed in Europe. She taught music in New Jersey and Nebraska. She also has performed in Broadway musicals and symphony orchestras. Currently she does choir and solo work for different specialized choirs on the Wasatch front.

Sue left her music and teaching career to work in sales for the oil and transportation industry to support herself and her three children as a single mother. Sue has worked in sales, national account management and sales team management for such companies as Sinclair Oil, Flying J, Petro Stopping Centers and C.R. England. She managed the national accounts division for Tennessee based Comdata Corporation.

After many years on the road she decided to settle down in Eden, Utah where she became a Real Estate Broker specializing in land and development. Sue served on the Utah Board of Realtors Board of Ethics for four years.

After much convincing over a five year period and a vacation of touring sheep dairy operations Sue relinquished to her husband's cheese making desires and agreed to pursue the sheep dairy industry. Sue attended the University of Wisconsin and studied at the Spooner Research facility in Wisconsin for dairy sheep. She also has studied and attended the Pipestone Sheep clinics in Minnesota specializing in sheep

health, sheep nutrition and lambing studies. Sue now runs the farm, the dairy, and maintains her flock as Shepherdess and co owner of Snowy Mountain Sheep Creamery in Eden, Utah.

Stig:
Stig Hansen is a Danish born immigrant to the United States since 1976. He attended boarding school and finished his apprenticeship while in Seaman's school. He began his chef career working in a 5-star hotel in Copenhagen then became chef for the Merchant Marines on board ship. He did his time in the Danish navy as a chef. He has been a executive chef and corporate chef for over 30 years. His chef experience comes from the following restaurants and companies: the Omaha Club, the Scandia restaurant in Beverly Hills, Hilton, Red Lion, Nendel's, and Embassy Suites. He joined Flying J in Utah to develop a chain of interstate restaurants. Later he joined Texas based Petro Stopping centers and Travel Centers of America. Stig is also the author of a legacy, a book for his countrymen and everyone interested in Danish cuisine called "Cooking Danish, A Taste of Denmark". After years of being a corporate executive chef Stig has opted out for a different life style. He is now the cheese maker and co owner of Snowy mountain Sheep Creamery, Utah's first dairy sheep operation based in Eden, Utah. Stig's cheeses took a first and a fourth place the very first year in business at the World Cheese championship In Wisconsin last March. Stig is enjoying this new venture with his wife Susan who operates the farm and flock.

Session Description:

This session will cover the following:

1) Selecting a name to your business
2) Business purpose, objectives and goals
3) Developing a mission statement
4) Selecting a Logo
5) Naming your product/products
6) Identifying your target Market
7) Identifying and marketing your ancillary products
8) Developing marketing concepts
9) Using the web, websites, blogs, facebook, email
10) Media coverage, magazine, newspaper, industry periodicals, radio
11) Event planning, CSA, Utah's Own, Slow Foods, Edible Wasatch, Other
12) Contests and awards
13) AGRI-Tourism: Tours or no tours, fees or no fees, sales or no sales, "The Rules"

Finding Your Niche in Ag-Tourism and in the Farm Markets

Biographical Information:

Tod Rowley
Jace Rowley
Rowley's South Ridge Farms Inc

Tod Rowley was raised on the fruit farms in southern Utah County. He graduated from Utah State University in marketing. He is married to Mindy and they have four children. Tod has been managing the Red Barn since 2000; and is currently the CFO for Rowley's South Ridge Farms Inc.

Session Description:

This session will cover the following:

- Promoting the farm experience
- What brings people to your farm
- Standing out from the crowd

Why Ag Should Care About Social Media

Biographical Information:

Paul Hill
Utah State University
Washington County Extension

Paul Hill is the 4-H & Agriculture Extension Agent in Washington County, Utah. He earned his bachelor's degree in Business Administration from Dixie State College of Utah graduating Magna Cum Laude in 2007. He went on to complete his M.B.A. at Southern Utah University in May 2011 and is a member of Beta Gamma Sigma. His interests of research and study include leadership and collaboration using new technologies and marketing through social media outlets. Paul enjoys public speaking, web design, blogging, canyoneering and reading. Paul and his wife have two sons and currently reside in Hurricane.

Session Description:

Farmers and ranchers should care about and use social media tools such as Facebook, Twitter and YouTube because this is how mass influence is perpetuated. Since Facebook reached 150 million users nearly three times faster than radio and the Internet, social media is a culture changer, not a fad. Those in the Ag industry need to know that if they're not at the table, they can't be a part of constructing the face of agriculture – nor can they counter the misinformation campaigns around food, fuel, feed or fiber. Plus, anti-ag activist groups are becoming increasingly active on social networks and they use the power of this new medium very well. The Humane Society has had a nearly 80-fold increase in their Twitter following since 2009. Videos on animal rights and environmentalism increase about 30% monthly. The conversations are going on about Ag – even if farmers and ranchers aren't at the table talking. It's time for agriculture to leverage the power of social media to influence public opinion.

Post Harvest Considerations for Fresh Market Produce

Biographical Information:

Dr. Dan Drost
Utah State University

Dan Drost grew up on a small diversified farm in western Michigan. He graduated from Michigan State University with a master's degree in Horticulture with an emphasis on vegetable production and physiology. He earned his PhD from Cornell University in Vegetable Crops. Prior to arriving in Utah, he taught horticulture in New Zealand and has worked for Utah State University since 1992. In addition to his research work with vegetables, Dan is interested in small farm production systems, organic agriculture, the creation of efficient farm systems, and intensive farm and land management.

Britney Hunter
Utah State University Extension

Britney grew up in Salt Lake City, Utah. She graduated with a B.S. in Horticulture from Utah State University in 2007. As an undergraduate she worked at a plant nursery and assisted some of USU's outstanding Extension Specialists, which inspired her interest in Extension. She earned a M.S. in Plant Science from Utah State University in 2010. Her graduate research involved cold temperature protection for vegetable crops grown in high tunnels to achieve out-of-season production. After some valuable internship experiences in student government, marketing, garden consulting, and youth education, she became the Davis County USU Horticulture Extension Agent in 2011.

Session Description:

This session will focus on fresh fruit and vegetable harvest scheduling, temperature requirements, storage techniques, structures, and resources

Pest Issues and Integrated Pest Management

Biographical Information:

Diane Alston
Department of Biology
Utah State University

Diane is an Extension and research entomologist at Utah State University. Her program focus is development and validation of integrated pest management technologies for fruit and vegetable crops in Utah. Diane has worked for Utah State University for 22 years. She is a native of southern California and attended graduate school in North Carolina. She lives in Richmond with her family and menagerie of animals.

Session Description:

This session will give a brief overview of online vegetable pest management resources.

Farmers' Market 101

Biographical Information:

Maryann Alston
Wasatch Front Farmers Market

Maryann Alston is the founder and director of the Wasatch Front Farmers Market, a division of Only Local. They are dedicated to providing local communities with local produce, foods, crafts, and processed goods. By doing so, they offer local farmers, food processors, and artists a vibrant, bustling place to make money. Their locations are handpicked to offer the public and vendors a unique experience and accessible place to purchase and sell local goods. Their markets are currently held year round at Gardner Village on Saturdays from 9am-2pm, and Wheeler Farm on Sundays from 9am-2pm. Their winter markets are once a month on select dates at certain locations.

Session Description:

This session will discuss selling and marketing at farmers' markets (setup, requirements, marketing, strategies, benefits, etc.)

Food Safety for Farmers' Markets

Biographical Information:

Karin Allen

Karin Allen is the food quality & entrepreneurship specialist at Utah State University Extension. Her programs include the development of extension programming to assist small businesses and entrepreneurs with production and processing of quality foods. She also coordinates academic and outreach services of the on-campus Food Innovation Laboratory and Incubator Kitchen. She also helps people meet the labeling requirements to meet State and/or Federal regulations.

Session Description:

Whether your products are made in a commercial or certified home kitchen, proper sanitation is the key to a high-quality product. In this session, food safety guidelines for small-scale food processors will be discussed.

Food Safety for Farmer's Markets

U.S.U. Extension Food Quality & Entrepreneurship
Karin Allen, Ph.D.

Diversified Ag Conference
February 24, 2012

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extension.usu.edu

Farmer's Markets & Stands

- Do not require registration with UDAF
- Only fresh, raw, whole, unprocessed foods
  - Cannot cut, process, prepare, or package produce
  - Greens cut through main stalk only, can be rinsed
  - Eggs must be maintained at 45˚F or below
  - Must be sold by the grower/producer

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Outdoor Markets & Stands

- Market & vendors must register with UDAF
- Can sell most types of processed foods
  - Cut leafy greens
  - Peeled, cut, or washed produce
  - Packaged fresh herbs
  - Dried or dehydrated produce

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Processing Options

- Contract Packagers (Co-Packers)
  - Will make & package your product in their down-time
- Certified Commercial Facilities
  - State or County-inspected kitchen
- Cottage Food Production
  - State-inspected home kitchen
  - Limited foods can be produced

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Allowed Cottage Foods

- Air cooled hard boiled eggs (shell intact)
- Foods with Aw ≤ 0.85
- Foods with pH ≤ 4.6
- Properly canned acid foods
- Other foods deemed non-hazardous

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Not Allowed!

Potentially Hazardous Foods

- Any food of animal origin (raw or heat treated)
- Food of plant origin that is heat treated
- Products containing raw sprouts
- Cut melons and tomatoes
- Non-acidified garlic and oil mixtures

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Safety Issues
Cottage / Commercial Kitchens

- How will you clean & sanitize?
- How will you prepare or cook your product to minimize safety risks?
- How will you package your product?
- How will you store & transport your product?

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Important Definitions

- Clean: Free of visible dirt or debris
  - Applies to whole, unprocessed foods
- Sanitary: Free of pathogenic bacteria
  - Applies to processed foods & food contact surfaces
- Sterile: Free of all viable bacteria
  - Commercial sterility – 99.99% sterile

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Safety Issues
Kitchen Sanitation

- Sanitize at start of production
  - 1 tbsp unscented bleach maximum per 1 gallon water (200 ppm)
  - Check sanitizer with test strips
- Wipe up spills, sanitize during production
  - Check / refresh sanitizer every hour
- Clean and sanitize at end of production

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Safety Issues
Kitchen Sanitation

- Commercial kitchens – 3 compartment sink
  - Scrape, pre-rinse station
  - Wash, rinse & sanitize sinks
  - Air dry
- Modification for home kitchens
  - Scrape, wipe into garbage can
  - Wash & rinse in kitchen sink
  - Sanitize in separate tub or container
  - Air dry

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Safety Issues
Outdoor Markets

- Refrigerated foods must be 41˚F or lower
  - Meat, fish, cheese, salsas, hummus, juice, yogurt, etc.
- Ice storage allowed
  - Properly packaged foods only
  - Ice must be constantly draining into another container

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UDAF Resources

- Cottage Production Certification
  Rebecca Nielson, (801)538-7152
- Food Establishment Certification
  Jay Schvaneveldt, (801) 538-7149
- Organic Certification
  Ron Larsen, (801)538-7187

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USU Extension Resources

- Food Quality & Entrepreneurship
  Karin Allen, PhD, karin.allen@usu.edu
  - Regulations, business start-up issues, Cottage product testing
- Food Safety
  Brian Nummer, PhD, brian.nummer@usu.edu
  - Process validation, safety plans, safety testing

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Questions?

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Business Plans

Biographical Information:

Beverly King
Weber State University Small Business Development Center

Beverly King has worked for the Small Business Development Center at Weber State University since 1992. Beverly holds a Master's Degree in Professional Accountancy from Weber State University. In addition to her job as Director of the Small Business Development Center, she has taught as an adjunct faculty member for the University's Accounting Department and Business Administration Department. Previous work experience includes financial accounting for Sears and cost accounting for Thiokol. Beverly's background in small business stems from growing up in a family owned grocery store in Willard, Utah.

Beverly has been married to Larry King for over 35 years. They enjoy two sons, two grandchildren, and numerous animals.

Session Description:

This session will focus on understanding the elements that should be included in a good business plan.

High Tunnels: If You Build It, Will They Come?

Biographical Information:

Stanley Carpenter
Annette Carpenter
Preston Berry Farms

My name is Stanley Carpenter. My wife and I have been married for 35 years. We have six children and 16 grandchildren. We were both employed with Delta Air Lines when the airline filed bankruptcy and our retirement loss was substantial. At this time my wife and I decided to reduce our expenses by selling our cars, airplane, and home. With great objections from our children we packed up and move to Preston Idaho without them. The air was fresh, the people friendly and the soil rich with promise. Our little farm consisted of a 100 year old home, an old red barn that was being held up by petrified manure and 5.6 acres of some of the riches soil found in Franklin County. As we walked our little piece of terrestrial heaven, my wife and I would behold breath taking sunrises and equally as spectacular were our sunsets and we knew this is where we wanted to stay. So, you ask why raspberries? The answer is… because we really like them. I wish we could say our dream of growing raspberries had no nightmares but when you try a new technique in farming and you have never done it before, neither has anyone around you there are things that happen. You see, we are the first in Southeastern Idaho to grow raspberries in High Tunnels. Yep, people stop by from all around to see them. We are glad they do because we not only give them a tour of the farm but we have the opportunity to share some of the biggest, juiciest, sweetest raspberries you will ever find on earth. That's when it happens…they reach for another and another and that makes us happy! So, I guess that makes me a raspberry farmer. Preston Berry Farms has been in operation since 2009. This year of 2012 will be our first year of full production from all 5000 of our hand planted raspberries. …and the children we left behind in the city visit us frequently.

Session Description:

This session will cover the following:

1. The advantages and disadvantages of high tunnel raspberry production vs. field production.

2. The upward trend in the raspberry specialty crop market.

3. Marketing raspberries year round as a value added product.

Livestock Nutrition

Biographical Information:

Dale ZoBell
Utah State University

Dale ZoBell has spent 32 years working in Extension in Alberta, Canada and Utah. He is a Beef Extension Specialist, Professor and Associate Department Head, Animal, Dairy and Veterinary Sciences Department at Utah State University.

Session Description:

This session will discuss nutrient requirements and analysis of common Utah feedstuffs. It will also include practical applications for production agriculture.

Good Agriculture Practices

Biographical Information:

Shawn Olsen
Utah State University

Shawn Olsen works as a USU Extension Agricultural Agent.

Session Description:

This session will focus on the value of good record keeping for farm operation.

Organic Certification

Biographical Information:

David Bell
Bell Organic & Utah Farms CSA

David Bell started Bell Organic in 1998 on a ½ acre in Salt Lake County and is currently growing 30+ varieties of vegetables on 26 acres of mostly leased land. Bell Organic is a certified organic grower since 2004 and a partner in the Salt Lake County Urban Farming Program.

Session Description:

This session will be an open forum discussion of the pros & cons of organic certification.

On The Sheep Trail

Biographical Information:

Matt Goble
Aimee Goble

Matt and Aimee Goble live in Nephi, Utah. They raise primarily sheep, and also grow alfalfa and small grains. Though Matt is a 6th generation sheepman, he has not been handed down my operation. His family has been raising sheep in Utah since the arrival of the pioneers. It was always a family operation that ran around 2500 ewes. Trials force the sale of the sheep and operation in the mid 1970s. A few sheep were always kept and now they are again raising sheep as a family full-time.

Session Description:

This session will include a brief history of the family and operation, why they decided to raise sheep and what led to their ability to do it full time. The session will also have points of interest that may be of help to others and why now is a great time to get into agriculture.

Running a Small Poultry Business

Biographical Information:

Julie Clifford
Clifford Family Farm

Julie Clifford has a 34-acre farm where they organically raise poultry, pork, bees and produce.

Session Description:

This session will talk about running a small poultry business; including: issues, organic certification, and dealing with government agencies.

General Care and Husbandry of Small Flocks of Chickens

Biographical Information:

David Frame
Utah State University
Central Utah Veterinary Diagnostic Laboratory

A 1980 graduate of Utah State University with a B.S. in Animal Science, Dr. Frame subsequently received his DVM degree from Oregon State/Washington State Universities in 1984. Dr. Frame completed an avian medicine residency with the University of California, Davis specializing in poultry pathology and diagnostics. He is board certified in the American College of Poultry Veterinarians. Dr. Frame was employed as chief veterinarian for Moroni Feed Company, an integrated turkey cooperative, for 12 years before joining the faculty of the USU Animal, Dairy, and Veterinary Sciences Department in 1998 as an Associate Professor. He serves as the USU Extension Poultry Specialist with an additional assignment as poultry diagnostician for the Utah Veterinary Diagnostic Laboratory.

Dr. Frame has served on elected and appointed national governing boards and committees, including the National Poultry Improvement Plan General Conference Committee (an advisory committee to the United States Secretary of Agriculture), American Association of Avian Pathologists Board of Directors, numerous positions with the Western Poultry Disease Conference Executive Committee, and Subject Editor for the Journal of Applied Poultry Research.

Session Description:

This session will discuss the provision of basic information on poultry nutrition and feeding, brooding, management, and health and welfare of chickens in a small flock setting.

For more handouts pertaining to this session, please see:
http://extension.usu.edu/htm/publications/by=category/category=39

August 2008 **AG/Poultry/2008-02pr**

Principles of Feeding Small Flocks of Chickens at Home

David D. Frame, DVM, Extension Poultry Specialist

Owning a small flock of chickens is increasing in popularity, particularly in areas prohibiting the raising of larger domestic animals. Chickens not only furnish a ready source of home-grown meat and eggs, but also provide great pleasure as exhibition stock and even as pets. Additionally, helping to raise a small flock of chickens gives children an opportunity to develop a sense of responsibility and learn basic management skills. The purpose of this fact sheet is to give an overview of feeding and nutrition principles for chicken owners.

Growth ability and performance of chickens is determined by genetics. Environment dictates whether they reach their full genetic potential and proper nutrition plays a critical role. It is important to remember two things when feeding chickens:

- A chicken will only grow and perform to the extent it receives proper nutrition.
- A chicken cannot grow beyond its maximum genetic potential.

Develop an Optimal Nutritional Program

Don't forget the water. . . .

It must be kept in mind that the nutrient consumed in the greatest quantity by a chicken is *water*. A direct relationship exists between the amount of water a chicken drinks and the amount of feed consumed. If inadequate water is available, not only will chickens cease eating, but there will also be a negative effect on egg production and growth.

Although types and designs of drinkers vary, the fact that fresh clean water must be present at all times should never be forgotten.

A popular fountain-type drinker is shown in Figure 1. Fountain drinkers have the advantage of being affordable and can easily be moved around; however, because the reservoir holds only a finite quantity of water, it is necessary to watch carefully that they don't become empty. Water should be changed frequently in order to prevent bacterial growth, over-warming (in summer), or freezing (in winter).

Figure 1. Fountain-type drinker. This particular model holds 1 gallon of water. Each drinker will provide enough daily water for 12 to 15 adult chickens during cool weather and 6 to 12 during hot weather.

Always provide at least two or three additional drinkers in excess of the estimated water consumption capacity for the number of birds in the chicken house. This provides a buffer for a short term water supply in the event of spillage or leakage. Also, it offers an opportunity for the more timid birds in the flock to satisfy their water needs without having to compete with more aggressive individuals for drinker space. When planning number of drinkers to place in the chicken house, consider that in cool weather each adult chicken will consume about 0.05 to 0.08 gallon per day; in hot weather, about 0.08 to 0.16 gallon.

Other types of watering systems include continuous flow troughs and reduced water pressure bell-type drinkers suspended from the ceiling that are hooked up to a pressurized water line.

The advantages of a continuous flow water system are that it won't freeze and there is a continual supply of fresh water. Acquiring such a system may be difficult, however, and because there is a continual flow of water, the cost and waste will usually be prohibitive for small flocks. Some sort of drainage system for the unused water would also be necessary.

A properly constructed bell-type drinker system provides a continual source of water, but is usually more appropriate for larger operations (Figure 2). A dedicated water line with a pressure regulator is needed, and the initial equipment cost is much greater than the stand-alone fountain-type drinkers.

Figure 2. Bell-type drinker supplied by a low pressure water line.

Quality of Feed Is Important

Feed quality will affect feed consumption. Ensure that the feed is not stale, rancid, or moldy. Immediately remove obviously moldy, rancid-smelling or any other questionable feed. Such feed will, at best, not be eaten; and at worst, cause disease or nutritional deficiencies if consumed. Always store feed away from heat, moisture, and direct sunlight. Purchase feed as fresh as possible. Vitamins will start to degrade if finished feed is stored for prolonged periods. Plan your schedule so that new feed is purchased at least every two months and check for a recent manufacturing date on the bag before buying.

No one feed ingredient contains all the nutrients required for a complete diet. Some ingredients are rich in one nutrient, but may lack in another. For example, soybean meal is rich in protein but contains relatively little energy from carbohydrates, while corn is high in carbohydrates (i.e. energy) but is a poorer source of protein. Together they complement each other in the complete feed. Each feedstuff has a place in a balanced diet.

There are five basic classes of nutrients needed. Table 1 lists the nutrients and gives examples of common feedstuffs supplying them.

Table 1. Classes of nutrients necessary for poultry and examples of feed ingredients in which each is found.

Nutrient	Feed ingredients
Carbohydrates (supply energy)	Corn, sorghum, wheat, other grains
Protein sources (supply amino acids)	Soybean meal, meat products, canola meal, fish meal
Fats (supply energy)	Vegetable oil, tallow, blended fat products
Minerals	Salt, limestone, calcium carbonate, calcium phosphate, oyster shell, commercial trace mineral mix
Vitamins	Commercial vitamin mixes, feedstuffs

These ingredients are mixed in different proportions and sold in the form of a mash, pellet, or crumble. Mash feed consists of all ingredients ground into particles and mixed loosely together.

Pelletized feed is mash that is held together with a binder and then heat-treated, extruded, and cut into various lengths and diameters depending on the type of feed produced. Crumbled feed consists of pelletized feed broken down into smaller pieces.

A chicken will stop eating once a certain quantity of energy has been consumed in a day. This will happen even if the bird has not ingested enough protein or vitamins. Therefore, the energy concentration needs to be in balance with the other nutrients in the diet. Commercial diet formulations take this into account. Because of the complex nature and expense involved in properly formulating and mixing poultry diets, it is highly recommended that feed be purchased from a reputable manufacturer and not attempted to be made at home. Even with increasing feedstuff prices, it is much more productive in the long run to feed your chickens high quality commercial feeds rather than skimping on cost or concocting homemade recipes.

Practical Styles of Feeding Systems

Feeders come in a wide array of sizes and designs from egg carton lids for starting newly hatched chicks to sophisticated automatic adult feeding systems. A practical trough feeder for starting off young chicks is shown in Figure 3. Bucket feeders (Figure 4) of various sizes are popular and appropriate for both growing and adult chickens. The advantage of bucket feeders is that they can store a few days' worth of feed, thereby alleviating daily hand feeding; however, care must be taken not to let old feed accumulate in them and become stale and moldy. Clean and brush out often. Use the appropriate size of bucket feeder for the class of poultry being raised. Using too large feeders with chicks will prevent them from being able to reach the feed. Also chicks might get inside the lip of the feeder and not be able to get back out. Using feeders with too narrow of a lip for adults birds will cause excessive waste of spilled feed into the litter (see Figure 4). Feeders should be raised off the ground, and generally positioned level to the mid to upper breast region of the chickens being fed.

A good rule of thumb is to allow 1 linear inch of feeder space per chick and 2 to 3 linear inches per adult chicken.

Always keep feeders in an area – preferably inside the chicken house – where the feed is protected from moisture, wild animals, and free-flying birds.

Figure 3. Small trough feeder sized for feeding young chicks.

Figure 4. Example of a bucket-type feeder of a suitable size for chicks and smaller adolescent-age chickens.

It is counterproductive to "unbalance" a balanced diet by including questionable supplements.

Commercial feed purchased from a reliable dealer, has all the nutrients chickens need to grow and thrive. If you have a good diet that fulfills all of the dietary needs, do not alter it. Usually a little more of a good thing will upset a balanced diet. A balanced approach to nutrition is the key to optimal growth and performance.

Common mistakes made with supplements:

- Giving vitamins and electrolyte supplements for more that 10 days.
- Supplementing complete feeds with cracked corn, oats, or other grains.
- Regularly adding green chops, lettuce, or other low nutrient ingredients to the diet.
- Administration of inappropriate or unnecessary medication.

It's OK to let your chickens forage around for bugs and greens, but always provide them access to the appropriate type of formulated balanced feed as well. Totally "free-ranged" poultry will rarely be able to consume a proper balance and quantity of nutrients necessary for maximum capable rate of meat and egg production.

Table 2. General feeding schedule for various classes of chickens*.

Meat-type strains (Commercial-type broilers, roasters, "Cornish-Rock" crosses) 0-2 weeks. . . . . 22-24% protein chick starter 2-4 weeks. . . . . 20-21% protein grower 4 weeks to market . . . 18-20% protein finisher
Layer strains (Commercial-type leghorns, brown egg layers) 0 to 6 weeks. . . . . 20-21% protein chick starter 6 to 10 weeks. . . . . 16-19% protein pullet grower 10 weeks to prior to Egg production. . . . . 5-17% protein pullet developer At onset of egg production. . . . . 16-18% protein layer diet**
Dual-purpose breeds (Plymouth Rock, Rhode Island Red, New Hampshire, etc.) 0 to 6 weeks. . . . . 20-21% protein chick starter 6 weeks to prior to egg production. . . . . 15-19% protein pullet grower/developer At onset of egg production . . . . . 16-18% protein layer diet**

*These recommendations are based on common protein levels for feeds available in most local feed stores. It is assumed that the finished feed is balanced for energy, vitamins, and minerals in relation to specific protein content.

**Do not feed a layer diet to chickens not in egg production (too high in calcium).

Feed Consumption Guidelines

There is great variation in feed consumption patterns of chickens depending on breed, feed source, and environmental conditions. The following information, however, serves as a guide in estimating feed consumption for large fowl breeds of poultry.

Commercial egg-type

- Feed/pullet – hatch to ready-to-lay (18 to 21 weeks): 13 to 15 lbs
- Layer – daily intake/hen: 98 to 107g (22 to 24 lbs/100 hens)
- Plan on higher consumption than this for non-commercial strains and non egg-type breeds.

Commercial meat-type

- Feed/bird – hatch to market age (about 7 weeks). . . . . 12.5 to 18 lbs
- Feed conversion (lbs feed/lb gain) 2.5 to 2.7
- Heavy standard-bred breeds will eat more feed than this guideline because of a tendency toward less efficient feed conversion.

As these basic nutritional principles are followed, your chickens will thrive and provide you with great enjoyment. For specific recommend-dations, contact your local county agent or Extension poultry specialist.

This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Noelle E. Cockett, Vice President for Extension and Agriculture, Utah State University.

July 2009 **AG/Poultry/2009-02pr**

Considerations in Raising Small Backyard Flocks of Poultry in Population-dense Communities

David D. Frame, DVM, Diplomate ACPV
Extension Poultry Specialist

During these times of economic challenge many people are considering raising a few chickens in the backyard to augment their food supply. This has raised numerous questions ranging from how to feed chickens to addressing local animal-keeping ordinances. Often, the answers are a work in progress for many communities. The following considerations should be taken into account.

Science-based Education Is Critical

Be cautious of advice from self-proclaimed "experts" or people with informal training who attempt to fill a perceived educational niche. Many would-be poultry raisers are novices or first time owners. Learning how to do things correctly from qualified science-based sources is paramount in order to be successful. Optimal decision-making must be based on facts – not hearsay or folktales. Utah State University Cooperative Extension offers research-based education in small flock poultry raising. County agents and an Extension poultry specialist are available to educate groups and community leaders in poultry health and management issues. Fact sheets are also available on line:
http://extension.usu.edu/files/publications/publication/AG_Poultry_2008-01pr.pdf
http://extension.usu.edu/files/publications/publication/AG_Poultry_2008-02pr.pdf
http://extension.usu.edu/files/publications/publication/AG_Poultry_Health_Biosecurity_01.pdf

Effects on the Economy

The commercial poultry industry contributes a significant and vital part to the agricultural economy of the U.S. Anything that jeopardizes the viability of this industry also jeopardizes the economic health of Utah. It is important that these commercial flocks be protected from serious diseases that would decimate this sector of Utah's economy. An upsurge in number of small backyard flocks, particularly if not properly managed, might significantly increase the probability of disease exposure to the commercial industry. Past history has shown that diseases such as exotic Newcastle disease (END) can become present in the small flock poultry community. Exotic Newcastle disease can cause tremendous poultry death in both the small backyard flocks and in large commercial poultry operations. The discovery of END, for example, will have devastating economic consequences from death loss as well as the loss of trade with other countries.

Community Impacts

The local community may experience unanticipated impacts from an abrupt unregulated increase in backyard poultry keeping. Any potential undesirable repercussions can be minimized through recognition and well thought out planning to ensure that all remain good neighbors.

Noise: Hens are quieter than roosters. There are no practical or humane methods to "de-crow" a male fowl. It takes experience and knowledge to properly identify the gender of young chicks. Your local farm implement store may not be able to provide this service reliably when chicks are purchased. Be prepared to cull roosters as the chicks mature. Hens do not need a rooster present in order to lay eggs.

Mixing of species. It is extremely risky to raise multiple species of poultry and waterfowl on the same premises – particularly if there is chance of exposure to wild birds. This is how many deadly poultry diseases get started, such as END or avian influenza ("bird flu").

Zoning. Some municipalities do not allow the raising of poultry or have strict ordinances that restrict this activity. Check with your city or county office to determine if there are specific regulations or restrictions that might preclude keeping poultry on your property. Along with city or county ordinances, some communities or subdivisions have rules or "covenants" that restrict the raising of poultry. Be sure to check if your domicile is in one of these.

Animal control. Chickens are no respecters of property lines. They are prone to wander at will into neighbors' yards and gardens. Remember chickens can also fly. To minimize the impact on neighbors, enclosures should be considered that properly restrain poultry and confine them to your property.

Animal waste. In many instances, used chicken litter can be incorporated into the garden soil or composted; however, improper composting or storage may create excessive odor and fly problems. Proper composting requires careful management of moisture, aeration, and temperature. Allowing chickens to superficially scratch through a pile of manure is not sufficient for optimal composting to occur for a number of reasons. There are many Extension publications from various universities addressing the issue of general composting techniques. These should be thoroughly perused during any decision-making process.

Disposal of deceased and spent fowl. It is important to realize that chickens have a relatively short life span. The productive life of a hen is about three to five years. Baby chicks soon grow up to be adult chickens and adult chickens end up as old chickens. Community leaders need to seriously address the issue of bird disposal. Do local ordinances allow birds to be buried on the premises or composted on-site or taken to the landfill?

Human health. Although in most circumstances chickens pose a relatively low risk of giving disease to humans, there are a few that can be transmitted back and forth. Proper care and handling of eggs and processing of poultry carcasses are critical to avoid problems. Appropriate disposal of dead birds and used litter are also important.

Mice thrive in areas where chicken feed is improperly stored and excessive spillage occurs. Rats could become a problem in excessively wet areas or where water leaks occur. Feed should never be sprinkled into the litter or floor of poultry houses. This only encourages rodents to hang around the coops. Feed is to be properly dispensed in hanging hoppers that limit access to marauding rodents. Also, unused feed should be stored in closed containers in a cool area. A rodent control program of bait feeding and/or trapping should be mandatory in addition to all other precautions.

Animal Welfare

Proper care and feeding. It is imperative that poultry owners learn and implement proper care of their birds. Inhumane practices such as denying poultry access to water or a protected coop during hot days or during inclement and cold weather are intolerable. Many would-be poultry owners may never have raised chickens or farm animals before. They may not realize what the proper care and feeding of poultry entails. Birds are to be provided with a proper diet at all times and not left to fend for themselves. Enough space must be provided to adequately accommodate the number of birds kept. This is where appropriate science-based education becomes indispensible.

Enforcement of noncompliance. If some type of local poultry permitting program is practiced, will there be sufficient funds and personnel to carry out the program? Does the community have the adequate resources and personnel to deal with people who break the rules or handle poultry in cruel or inhumane ways?

Protection from predators and disease. Chickens are to be enclosed in a coop at night to protect them from predators. Although the debate could go on *ad infinitum* as to what the optimal construction should be, common sense is usually adequate. Doors should tightly close, glass or strong plastic windows should be used, and a solid floor should be in place. Periodic

inspection around the coop will indicate if varmints are trying to enter. Then take care of the varmint problem.

Outside runs need to be covered with good quality wire or roofing that will keep out wild birds and keep the chickens inside. Many people might find this a serious inconvenience, but it is imperative! Wild birds can carry diseases that could kill their birds or set up a reservoir of infection that could get into the area's commercial poultry industry with devastating consequences. This is a risk that any responsible community governing body should not take. The satisfactory demonstration of properly enclosed and restrained chickens should be a mandatory requirement in any permitting process.

Disease transmission. Chicks must be purchased from sources certifying that they are free from specific diseases. Certain species of poultry can carry organisms that may do little harm to them but could cause devastating disease in another species. Mixing of species, such as ducks and chickens or chickens and turkeys increases the potential infection and spread of avian influenza (bird flu). Raising chickens and turkeys together could cause devastating disease in the turkeys. It is important to understand the nature of poultry diseases and how to deal with them. Contact your local veterinarian or Extension poultry specialist for further information on disease transmission and optimal biosecurity practices.

Visit these Web sites for other important information:
http://extension.usu.edu/files/publications/factsheet/AG_poultry_2005-01.pdf
http://www.aphis.usda.gov/animal_health/birdbiosecurity/
http://ag.utah.gov/divisions/animal/health/index.html#avianHealth

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Land Use Issues for Urban Agriculture

Biographical Information:

Danny McDowell
McDowell Family Farms

Danny is a local, novice, pastured poultry farmer. He has raised and sold turkeys and meat chickens on pasture the last two years. They added pastured eggs last year.

David Bell
Bell Organic & Utah Farms CSA

David Bell started Bell Organic in 1998 on a ½ acre in Salt Lake County and is currently growing 30+ varieties of vegetables on 26 acres of mostly leased land. Bell Organic is a certified organic grower since 2004 and a partner in the Salt Lake County Urban Farming Program.

Julie Peck- Dabling
Salt Lake County

Julie Peck-Dabling has served as Salt Lake County's Urban Farming Program Manager since its inception in 2009. The purpose of the program is to maximize the value of county owned land for residents by providing spaces for community gardens, commercial farming and biofuel production.

In 1999 Julie moved from a condo in Park City to a 60s rambler in Holladay with fruit trees and grape vines. She did her first canning that year! Since then she added a garden growing several different varieties of tomatoes and peppers.

She also runs the County's open space program, preserving land in the State's most populous county for recreation, trails, and watershed.

She has a bachelor's degree from Westminster College.

Session Description:

This session will discuss urban land use issues. Danny McDowell will talk about his farming experience the last two years as it pertains to land issues. David Bell will discuss personal insights & experience of more than a decade of urban agriculture land issues such as; Land Acquisition (purchase & lease), Water, Cultural Practices, Municipal interaction, Community relations, etc.

Julie Peck-Dabling will talk about the Urban Farming Program. The County embarked on an urban farming program in 2009, not knowing what kind of response to expect. It was extremely positive, but in a sense overwhelming. Since then, there have been successes and a few missteps that will be highlighted in the presentation. An important component of urban agriculture is educating public officials about policy decisions that negatively affect industry. An example is the 2012 legislation to reduce greenbelt from 5 acre minimum to 2 acres. The Legislature is deliberating the bill this year.

Providing a Way for the Next Generation to Take Over

Biographical Information:

Rulon Fowers
Nathan Fowers
Circle F Farms

Rulon (father) and Nathan (son) work together as Circle F Farms, a diversified farming business that includes several different enterprises. It was established first as C & R Dairy with Rulon as the son and Carl as the father. The dairy cows were sold in 1993 and they became Circle F Farms in 1994. It is now primarily a cow/calf, row crop, and custom farming business.

Session Description:

This session will discuss thinking outside the box and figuring out what to do and how to do it when the next generation wants to be involved. It will talk about how to provide opportunities to increase revenue. Nathan will explain how he got started. Rulon will explain how he let Nathan assume some management roles.

Utah Agriculture Outlook and Making Decisions for Your Farm to Improve the Bottom Line

Biographical Information:

Lyle Holmgren
Utah State University

Lyle received his BS Degree from Utah State University in 1987 and his MS Degree in Agricultural Economics also from USU in 1989. He was employed as a Research Coordinator at the University of Nebraska in 1989 then as an Extension Agent at USU since 1990. Approximately 60 percent of his time is spent working with livestock and crop producers where his focus is on the Futures and Hedging, Price Discovery, Option on Futures Contracts, Strategies, and Farm and Ranch Management. The balance of his assignment is working with the 4-H program, primarily on livestock and horse project areas. Lyle has used information and technology and productive partnerships to build capacity in people and provide better insight into some of their concerns and problems. In 2006, he has received the "Taggart Ballard Award of Excellence in Extension" and the National Association of County Agricultural Agents "Distinguished Service Award" in 2010. Lyle was born and raised in Box Elder County. He married Kathy Larsen in 1978. They have five children and four grandchildren. They live in Tremonton.

Session Description:

In recent years there have been many changes in the major crop and livestock markets. These can be overwhelming to keep up with. Have you wanted to know why prices change and what they are expected to be? Or how to incorporate those expectations into your plans? Then this session is for you.

These changes in the markets mean both changes in prices and costs, but also in profit for farmers and ranchers. This session will provide outlook information for what is happening in the major livestock and crop markets. It will show you how global influences are affecting those markets and what it means for you. In addition, this session will show how to incorporate this knowledge into budgets and your plans. This session will also cover ways for you to stay informed and continue to make changes in your operation. Even if you are a small farmer selling locker beef, this session can be invaluable in understanding the market forces and how you should price your products.

Working With Extension to Develop Your Farm Plan

Biographical Information:

Katie Wagner
USU Extension, Salt Lake County

Katie grew up in Lexington, Kentucky where she attended the University of Kentucky and was a member of the Environmental Soil Chemistry Lab under the direction of Dr. Chris Matocha. She completed a B.S. in Topical Studies: Environmental Science and Policy and a M.S. in Plant and Soil Sciences. Katie moved to Utah in 2006 and completed a B.S. in Ornamental Horticulture from Utah State University in 2009. She has worked for several local horticultural businesses including Millcreek Gardens, Cactus and Tropicals, and Isalo Garden Design. Katie is currently employed by Utah State University Cooperative Extension as an Extension Assistant Professor of Horticulture in Salt Lake County.

Britney Hunter
Utah State University Extension

Britney grew up in Salt Lake City, Utah. She graduated with a B.S. in Horticulture from Utah State University in 2007. As an undergraduate she worked at a plant nursery and assisted some of USU's outstanding Extension Specialists, which inspired her interest in Extension. She earned a M.S. in Plant Science from Utah State University in 2010. Her graduate research involved cold temperature protection for vegetable crops grown in high tunnels to achieve out-of-season production. After some valuable internship experiences in student government, marketing, garden consulting, and youth education, she became the Davis County USU Horticulture Extension Agent in 2011.

Jody Gale
Sevier County & Southern Area Extension Agent
Utah State University Extension

Jody A. Gale has worked for Utah State University Extension Cooperative Service for 23 years. He served as Millard County Extension Agent for 10 years and has worked for as Area Agent and Sevier County Extension Agent for the past 13 years. He received a Master's of Science degree in Plant Science – Crop Management from Utah State University in 1988, a Bachelors of Science Plant Science – Agronomy in 1986 and an Associates of Applied Science in Building Construction from Utah Valley University (formerly Utah Technical College) in 1982. He is an agronomist by training and practice and also provides agricultural economic development by practice. He has practical experience with agricultural, ag. business development, economic development, public lands, and natural resources. Significant programs and interests include: forage marketing and dairy relocation, alfalfa, natural resource issues, pruning, etc. Jody and his wife Cindy have six children and 5 grandchildren and live in Annabella, Utah where they enjoy serving people, gardening, construction and family centered outdoor activities.

Shawn Olsen
Utah State University

Shawn Olsen works as a USU Extension Agricultural Agent.

Donna Minch
Utah State University

Donna Minch is a Utah State University Horticulturist, who coordinates the off-campus degree programs offered by the Plant Soils and Climate dept. She is also the advisor to all the students in the program and recruits students and advises as part of her advising duties.

The Plant Soils and Climate department started teaching classes at the Farmington Botanical Garden in the late 80s. In 1995 Donna came on as the coordinator and reorganized the program to now serve over 100 students per year along the Wasatch front.

Mike Pace
Utah State University Extension

Mike graduated from USU with a Bachelor's Degree in Ag Education and a Master Degree in Agriculture Systems Technology and Education with emphasis in Extension Education. He currently works in Box Elder County as the Agriculture and Horticulture Agent. His primary assignment includes working with

commercial fruit and vegetable growers, home horticulture, alfalfa, corn and small grains crops on irrigated and dryland farms. His work includes safflower variety trials, seeding rates and row spacing studies, and dormant versus spring seeded safflower.

Mike and his wife Rhonda have six children and they enjoy camping, gardening and being outdoors.

Session Description:

This session will cover the following:

This is a great session for those that want to start their own small farm or are wondering what resources are available to help them refine what they are doing. This session will cover what should be considered in developing your plan for your farm and the resources from Utah State University Extension and others that can help you. Below are the topics that will be covered.

1. Explanation of what USU Extension is. USU Extension is an outreach componeant of Utah State University. This section will briefly cover what it Extension is, how it relates to the University and why you should want to know about it.

2. Assessing your situation – It is important to understand what you have available and what you want to invest in terms of time, money, and other things. This will also cover looking at where you will market your product and other considerations.

3. Technical Resources available and producing your crop. This section will cover things to consider as you are growing your crops and resources to help including soil and water testing and plant pest diagnostic lab.

4. Educational Resources – These include non-credit workshops and classes. The Master Gardner program as well as many online resources including the Small Acreage Website. This section will also cover the for credit degree programs available.

5. Other groups to work with and use as a network – there are many groups and people interested in small farms and related issues. This section will provide a few of those and will discuss why you might want to work with different ones and develop your network.

Useful Diversified Agriculture Organizations and Websites

CSA Utah – comprehensive listing of Community Supported Agriculture (CSA) growers along the Wasatch Front. "CSAUtah.org is your gateway to Community Supported Agriculture in Utah."
www.csautah.org

Utah's Own – listing of Utah's Own products and where to buy them. "Keeping it here at home…Utah's Own."
http://utahsown.utah.gov

Slow Food Utah – Listing of businesses, events, and press coverage of local foods. "Building Community Through Food."
www.slowfoodutah.org

Wasatch Community Gardens – Community gardens, workshops, and youth programs focused on growing and enjoying organic foods in the Salt Lake Valley. "We believe the quality of a community is directly related to the quality of its food."
http://wasatchgardens.org

Jordan Valley Conservation Garden Park – Educational garden, classes, and resources focused on helping the Wasatch Front learn how to reduce water use through proper landscape maintenance and plant choice. "Inspiring, educating, and empowering our communities to be waterwise."
http://conservationgardenpark.org

U of U Lifelong Learning – Not for credit continuing education classes for Wasatch Front residents. "Define Your Life, Define Your Lifelong Learning."
http://continue.utah.edu/lifelong

Red Butte Garden – U of U botanical garden, gardening classes, and workshops for both adults and kids. "To cultivate the human connection with the beauty of living landscapes."
www.redbuttegarden.org

Salt Lake County Urban Farming – Map of community gardens and farmer's markets in Salt Lake County.
www.urbanfarming.slco.org

Utah Department of Agriculture Sustainability Task Force – Information regarding policies and statistics surrounding local agriculture including agriadvocates.org. "In the war to prevent our dependence on imported food, this is the front line."
http://ag.utah.gov

Department of Natural Resources – Information and educational resources on State Parks and Recreation, Oil, Gas, and Mining, Wildlife Resources, Water Rights, Water Resources, Fire, Forestry, and State Lands, and Geological Survey.
http://naturalresources.utah.gov

Estimating Your Expenses, Profit, and Market Potential Using High Tunnels Examples

Biographical Information:

Ruby Ward
Utah State University

Dr. Ruby Ward was raised on a farm and ranch in South-eastern Idaho. After graduating from Ricks College, she received a BS in Agricultural Economics and Accounting from Utah State University. From Texas A&M University she received an MBA and a PhD in Agricultural Economics. Dr. Ward joined the faculty at Utah State University in 1998 and was tenured in 2005. Ward is currently an associate professor and extension specialist at Utah State University in the Department of Applied Economics. Her current assignment involves all three areas emphasized at a land grant University—teaching, research and extension. She teaches agricultural finance and community planning. Ward is the committee chair for the Diversified Agricultural Conference. Ward is the project leader for the Rural Tax Education website and Co-chair of the National Farm Income Tax Extension Committee. Ward works primarily in the area of rural development focusing on regional economics and agriculture entrepreneurship.

Dr. Dan Drost
Utah State University

Dan Drost grew up on a small diversified farm in western Michigan. He graduated from Michigan State University with a master's degree in Horticulture with an emphasis on vegetable production and physiology. He earned his PhD from Cornell University in Vegetable Crops. Prior to arriving in Utah, he taught horticulture in New Zealand and has worked for Utah State University since 1992. In addition to his research work with vegetables, Dan is interested in small farm production systems, organic agriculture, the creation of efficient farm systems, and intensive farm and land management.

Session Description:

This session is for those are that are already producing vegetables and berries and want to incorporate high tunnels into their plan or are already doing so but need to refine their plan. This session will cover

both production issues and economic and marketing issues. A scenario of a one – acre high tunnel operation will be used as an example to show how to develop your plan and assess market potential and profit. Specific areas that will be covered are:

1. Budgets for high tunnel crops and the assumptions made
2. Combining multiple crops into a plan for the whole farm
    a. Production Schedule
    b. Farm Layout
    c. Economic considerations
3. Market Assessment – How to analyze how many customers you need or how much of a crop you need to grow to service your customers.
4. Putting the pieces together and looking at how different plans will affect profit.

High Tunnel June-bearing Strawberry Budget 2010
Based on a 14' x 96' High Tunnel
Utah State University Extension

	Units	Number of Units	Price or Cost/Unit	Total	Your Operation
Receipts					
Early Out-of Season Strawberries	1 lb clambshell	837	$4.50	$3,766.50	
In-Season Strawberries	1 lb clambshell	196	$3.00	$588.00	
Total Receipts				**$4,354.50**	
Supply Expenses					
Preplant and Preparation Costs					
Soil Test	each	1.00	$14.00	$14.00	
Fuel	gal	0.38	$2.50	$0.95	
Fertilizer and soil ammendments	lbs	2.25	$15.00	$33.75	
Plastic mulch	ft	281.00	$0.05	$14.05	
Drip tape	ft	563.00	$0.05	$28.15	
Strawberry Establishment and Growth					
Plug plants	each	743.00	$0.26	$193.18	
20-20-20 fertilizer mix	lbs	11.34	$1.23	$13.95	
10-30-20 fertilizer mix	lbs	2.84	$1.49	$4.23	
Captan	lbs	0.43	$9.82	$4.22	
Thionex 50W	lbs	0.03	$7.51	$0.23	
Strawberry Harvest					
1 lb clamshells	each	1033.00	$0.21	$216.93	
Total Supply Expenses				**$523.64**	
Labor Expenses					
Preplant and Preparation Costs					
Soil tests	hours	0.50	$10.00	$5.00	
Apply fertilizer	hours	0.75	$10.00	$7.50	
Tillage	hours	7.50	$10.00	$75.00	
Form raised beds	hours	21.00	$10.00	$210.00	
Cover with plastic mulch	hours	3.75	$10.00	$37.50	
Install drip tape	hours	0.75	$10.00	$7.50	
Strawberry Establishment and Growth					
Planting	hours	6.00	$10.00	$60.00	
Fertigation	hours	2.00	$10.00	$20.00	
Pesticide application	hours	4.50	$10.00	$45.00	
Hand weeding	hours	4.00	$10.00	$40.00	
Plastic and shade cloth	hours	12.00	$10.00	$120.00	
Monitoring and ventilation	hours	30.00	$10.00	$300.00	
Strawberry Harvest					
Hand harvest	hours	86.00	$10.00	$860.00	
Post Harvest					
House clean out	hours	4.50	$10.00	$45.00	
Total Labor Expense				**$1,832.50**	
Total Operating Expenses				**$2,356.14**	
Ownership Expenses					
Annual Depreciation for High Tunnel				$241.17	
Annual Depreciation for Irrigation System				$58.82	
Totat Ownership Expenses				**$299.99**	
Total Expenses				**$2,656.13**	
Net Return				**$1,698.37**	

Prepared by Daniel Rowley, Brent Black and Dillon Feuz

High Tunnel Early Tomato Budget 2011
Based on a 14' X 96' High Tunnel
Utah State University Extension

	Units	Number of Units	Price or Cost/Unit	Total	Your Operation
Sales of Tomatoes	lbs	1,700	$2.00	**$3,400.00**	
Supplies					
Preplant and preperation costs					
Soil Test	each	1	$14.00	$14.00	
Fuel	gal	1	$2.50	$2.50	
Preplant fertilizers N-P-K	lbs	8	$1.00	$8.00	
Compost	tons	0.45	$50.00	$22.50	
Plastic mulch	ft	290	$0.05	$14.50	
Drip tape	ft	290	$0.05	$14.50	
Establishment					
Transplants	each	200	$0.25	$50.00	
Plastic for low tunnels	ft	300	$0.20	$60.00	
Wood stakes	ea	100	$0.45	$45.00	
Baling twine	ft	2600	$0.01	$15.60	
46-0-0 Urea	lbs	1.5	$0.33	$0.50	
Tomato Harvest					
Harvest boxes	each	20	$1.00	$20.00	
Market boxes	each	25	$2.40	$60.00	
Total Supply Expenses				**$327.10**	
Labor					
Preplant and Preperation costs					
Soil test	hours	0.5	$10.00	$5.00	
Apply preplant fertilizers	hours	0.75	$10.00	$7.50	
Tillage	hours	2	$10.00	$20.00	
Plastic mulch installation	hours	3.75	$10.00	$37.50	
Install Drip tape	hours	0.75	$10.00	$7.50	
Establishment					
Planting labor	hours	2.5	$10.00	$25.00	
Install low tunnels	hours	3	$10.00	$30.00	
Tomato Training	hours	8	$10.00	$80.00	
Weeding	hours	6	$10.00	$60.00	
Plastic and Shade cloth	hours	12	$10.00	$120.00	
Irrigation and Temp. Mgmt.	hours	26	$10.00	$260.00	
Tomato Harvest					
Harvest and grading	hours	24	$10.00	$240.00	
Post Harvest					
House clean out	hours	4.5	$10.00	$45.00	
Total Labor Expense				**$937.50**	
Total Operating Expenses (supplies and Labor)				**$1,264.60**	
Ownership Expenses					
Annual Depreciation for High and Low Tunnels				$341.48	
Annual Depreciation for Irrigation System				$74.03	
Total Ownership Expenses				**$415.52**	
Total Expenses				**$1,680.11**	
Net Return				**$1,719.89**	

Prepared by Britney Hunter, Dan Drost and Ruby Ward

High Tunnel Early Squash Budget 2011
Based on a 14' X 96' High Tunnel
Utah State University Extension

	Units	Number of Units	Price or Cost/Unit	Total	Your Operation
Sales of Squash	lbs	500	$3.00	$1,500.00	
Supplies					
Preplant and preperation costs					
Soil Test	each	1	$14.00	$14.00	
Fuel	gal	1	$2.50	$2.50	
Preplant fertilizers N-P-K	lbs	8	$1.00	$8.00	
Compost	tons	0.45	$50.00	$22.50	
Plastic mulch	ft	290	$0.05	$14.50	
Drip tape	ft	290	$0.04	$11.02	
Establishment					
Transplants	each	200	$0.25	$50.00	
Plastic for low tunnels	ft	300	$0.20	$60.00	
Baling twine	ft	800	$0.01	$4.80	
46-0-0 Urea	lbs	1.5	$0.36	$0.54	
Squash Harvest					
Harvest boxes	each	20	$1.00	$20.00	
Market boxes	each	10	$2.40	$24.00	
Total Supply Expenses				**$231.86**	
Labor					
Preplant and Preperation costs					
Soil test	hours	0.5	$10.00	$5.00	
Apply preplant fertilizers	hours	0.75	$10.00	$7.50	
Tillage	hours	2	$10.00	$20.00	
Install Drip tape	hours	0.75	$10.00	$7.50	
Plastic mulch installation	hours	3.75	$10.00	$37.50	
Establishment					
Planting labor	hours	2.5	$10.00	$25.00	
Install low tunnels	hours	3	$10.00	$30.00	
Weeding	hours	6	$10.00	$60.00	
Plastic and Shade cloth	hours	8	$10.00	$80.00	
Irrigation and Temp. mgmt.	hours	26	$10.00	$260.00	
Squash Harvest					
Harvest and grading	hours	30	$10.00	$300.00	
Post Harvest					
House clean out	hours	3.5	$10.00	$35.00	
Total Labor Expenses				**$867.50**	
Total Operating Expenses (supplies and labor)				**$1,099.36**	
Ownership Expenses					
Annual Cost of High and Low Tunnels				$343.58	
Annual Cost of Irrigation System				$75.50	
Total Ownership Expenese				**$419.08**	
Total Expenses				**$1,518.44**	
Net Return				**($18.44)**	

Prepared by Dan Drost and Ruby Ward

Converting High Tunnel Budgets to whole Farm

1. We made assumptions on the amount of labor that would be hired.
    a. For strawberries we assumed that of the 86 hours in the budget 68.8 hours would be hired with the owner/manager providing the rest.
    b. For tomatoes we assumed that of the 93.75 hours 69.2 hours would be hired with the owner providing the rest
    c. For squash the budget had 86.75 hours. It was assumed that 66.5 would be hired.
2. The costs for harvest boxes on tomatoes were assumed to last for 4 years and so only 25% of the cost was used.
3. Costs to get setup

Costs per acre	**#**	**Units**	**Cost/unit**	**Total Cost**
Land	1	Acre	30,000	30,000
Tunnels Construction	20	each	$ 1,627.69	32,554
Irrigation	20	each	$ 24.39	488
Pipelines	1	each	3000	3,000
				66,042

Whole Farm equipment costs Equipment					
Pickup	1	each		8,000	8,000
Tractor	1	each		6,000	6,000
Trailer	1	each		1,500	1,500
Other	1	each		2,000	2,000
tiller	1			1,500	1,500
plastic layer	1			2,000	2,000
*injector	each	1	$	265.00	$ 265.00
* filter	each	1	$	12.50	$ 12.50
* pressure regulator	each	1	$	11.00	$ 11.00
*Instalation	hours	4	$	10.00	$ 40.00
					21,329

4. Extra costs to operate the farm.

Gas	133.3333	gallons	4	467
Farmer's market	1	season	200	200
supplies	1		2,000	2,000
insurance	1		2,000	2,000
				4,667

5. Other assumptions.

Longterm profitability

Numbers to Input		Number of acres	1	
Analysis Numbers		Tunnels per acre	20	
		Revised costs?	yes	
Initial Cost-whole farm	$21,329	revised labor?	yes	
initial cost-per acre	$66,042	Land value	30000	
Terminal	$30,000	Percent farmers r	100%	
Owner Labor expense	$24,000	Payment	$6,510.36	
Growth		**Net present valu**	**$6,294**	
receipts	1.00%	**IRR**	**13.24%**	
Expenses	2.00%	**MIRR**	**11.49%**	
Tax rate	20.00%	**payback**		
% financed	50.00%	**Depreciation schedule**		
Finance rate	8.00%	new fan		
Discount rate	10.00%			
Yrs financed	10			

Depreciable Assets		
Buildings		7 year
Equipmer	21,329	7 year
Tunnel	36,042	3 year

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0.25	0.375	0.25	0.125				
0.1071	0.1913	0.1503	0.1225	0.1225	0.1225	0.1225	0.0613

Table 1. Cash flow information for 1 acre of double-cropped tomatoes and squash using high tunnels.[a]

Year >>	0	1	2	3	4	5	6	7	8	9	10
Receipts											
Tomatoes		68,000	68,680	69,367	70,060	70,761	71,469	72,183	72,905	73,634	74,371
Squash		20,000	20,200	20,402	20,606	20,812	21,020	21,230	21,443	21,657	21,874
Terminal Value											30,000
Cash Inflow		**88,000**	**88,880**	**89,769**	**90,666**	**91,573**	**92,489**	**93,414**	**94,348**	**95,291**	**126,244**
Expenses and Cash Outflow											
Down	43,685										
Supplies		9,904	10,102	10,304	10,510	10,721	10,935	11,154	11,377	11,604	11,836
Labor Hired		27,140	27,683	28,236	28,801	29,377	29,965	30,564	31,175	31,799	32,435
Owner Labor[b]		24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Operating		4,667	4,760	4,855	4,952	5,051	5,152	5,255	5,361	5,468	5,577
Depreciation		11,295	17,596	12,216	7,118	2,613	2,613	2,613	1,307	0	0
Interest		3,495	3,254	2,993	2,712	2,408	2,080	1,725	1,342	929	482
Principal		3,016	3,257	3,517	3,799	4,103	4,431	4,785	5,168	5,582	6,028
Taxable Income		31,500	25,486	31,164	36,573	41,404	41,745	42,103	43,786	45,492	75,914
Income Taxes		6,300	5,097	6,233	7,315	8,281	8,349	8,421	8,757	9,098	15,183
Cash Outflow	43,685	78,521	78,632	81,109	83,558	85,919	87,409	88,932	90,749	92,599	100,224
Net Cash Flow	**-43,685**	**9,479**	**10,248**	**8,660**	**7,109**	**5,655**	**5,080**	**4,482**	**3,599**	**2,692**	**26,021**

[a] Returns are based on 20 high tunnels per acre which utilize 61.7% of the space, leaving the remainder for spacing and roads. The returns represent either early tomatoes followed by late squash, or early squash followed by late tomatoes.
[b] Owner labor is listed separately to represent a return for the owner's time. It is not deducted to determine taxable income.

Table 2. Cash flow ($) information for 1 acre of strawberries using high tunnels.[a]

Year >>	0	1	2	3	4	5	6	7	8	9	10
Receipts ($)											
Strawberries		87,090	87,961	88,841	89,729	90,626	91,532	92,448	93,372	94,306	95,249
Terminal Value											30,000
Cash Inflow		**87,090**	**87,961**	**88,841**	**89,729**	**90,626**	**91,532**	**92,448**	**93,372**	**94,306**	**125,249**
Expenses and Cash Outflow ($)											
Down	43,685										
Supplies		10,473	10,682	10,896	11,114	11,336	11,563	11,794	12,030	12,271	12,516
Labor Hired		26,410	26,938	27,477	28,027	28,587	29,159	29,742	30,337	30,944	31,562
Owner Labor[b]		24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Operating		4,667	4,760	4,855	4,952	5,051	5,152	5,255	5,361	5,468	5,577
Depreciation		11,295	17,596	12,216	7,118	2,613	2,613	2,613	1,307	0	0
Interest		3,495	3,254	2,993	2,712	2,408	2,080	1,725	1,342	929	482
Principal		3,016	3,257	3,517	3,799	4,103	4,431	4,785	5,168	5,582	6,028
Taxable Income		30,751	24,731	30,403	35,807	40,631	40,966	41,319	42,995	44,695	75,111
Income Taxes		6,150	4,946	6,081	7,161	8,126	8,193	8,264	8,599	8,939	15,022
Cash Outflow	43,685	78,210	78,317	80,789	83,233	85,589	87,075	88,593	90,405	92,251	99,870
Net Cash Flow	**-43,685**	**8,880**	**9,644**	**8,052**	**6,496**	**5,037**	**4,457**	**3,854**	**2,967**	**2,055**	**25,379**

[a] Returns are based on 20 high tunnels per acre which utilize 61.7% of the space, leaving the remainder for spacing and roads. The returns represent "June-bearing" strawberries, which can be produced for 8 weeks.
[b] Owner labor is listed separately to represent a return for the owner's time. It is not deducted to determine taxable income.

Table 3. The net present value ($) of 1 acre of high tunnels tomatoes, squash and strawberries over various prices and values of owner labor.[a]

		Value of Owner Labor ($)					
Price	**-**	**12,000**	**18,000**	**24,000**	**36,000**	**48,000**	**60,000**
Tomatoes and Squash for Various Prices [b]							
$0.75 tomato, $0.62 squash	(122,014)	(201,517)	(241,269)	(281,021)	(360,525)	(440,029)	(519,532)
$2 tomato, $2 squash	165, 302	85,798	46,046	6,294	(73,209)	(152,713)	(232,217)
$5 tomato, $3 squash	736,870	657,367	617,615	577,863	498,359	418,856	339,352
Strawberries	161,513	82,009	42,257	2,505	(76,998)	(156,502)	(236,006)

[a] Returns are based on 20 high tunnels per acre which utilize 61.7% of the space, leaving the remainder for spacing and roads. The returns represent either early tomatoes followed by late squash or early squash followed by late tomatoes.
[b] Tomato and squash prices are based on a low wholesale pricing scenario (typical of outdoor field production), a mid level farmers market scenario (smaller rural setting) and a high-end farmers market (typical of a more affluent or resort community). Strawberries are mostly produced out of season and command a higher more fixed price.

Table 4. The Net present value of 1 acre of high tunnels tomatoes, squash and strawberries over various prices and values of land.[a]

	Current Value of land						
Price	**5,000**	**10,000**	**20,000**	**30,000**	**50,000**	**75,000**	**100,000**
Tomatoes and Squash for various prices [b]							
$.75 tomato, $.62 squash	(265,628)	(268,707)	(274,864)	(281,021)	(293,335)	(308,728)	(324,121)
$2 tomato, $2 squash	21,687	18,609	12,451	6,294	(6,020)	(21,413)	(36,806)
$5 tomato, $3 squash	593,256	590,177	584,020	577,863	565,549	550,15	534,763
Strawberries	17,898	14,820	8,663	2,505	(9,809)	(25,202)	(40,595)

[a] Returns are based on 20 high tunnels per acre which utilize 61.7% of the space leaving the remainder for spacing and roads. The returns represent either early tomatoes followed by late squash or early squash followed by late tomatoes or "June" bearing strawberries. All scenarios use $24,000 per year for owner labor.
[b] Tomato and squash prices are based on a low wholesale scenario a mid level farmers market scenario and a high farmers market scenario. Strawberries are mostly produced out of season and can command a higher more fixed price..

Table 5. The number of acres of production required to meet various levels of market share in Utah for fresh produce with normal outdoor harvest intervals and extended harvest periods utilizing high tunnels.[a] [b]

Percent of	Strawberries		Tomatoes		Squash		All Three	
Market	4 wks	8wks	9wks	17 wks	13 wks	21 wks	outdoor	w/tunnel
0.25%	0.2	0.3	0.7	1.2	0.7	1.2	1.5	2.7
0.33%	0.2	0.4	0.9	1.6	1.0	1.5	2.0	3.6
0.50%	0.3	0.7	1.3	2.5	1.4	2.3	3.1	5.5
1%	0.7	1.3	2.6	4.9	2.9	4.7	6.2	10.9
5%	3.3	6.6	13.0	24.6	14.4	23.3	30.8	54.5
10%	6.6	13.3	26.1	49.2	28.8	46.6	61.5	109.1
20%	13.3	26.6	52.1	98.5	57.6	93.1	123.0	218.1
40%	26.6	53.1	104.3	196.9	115.3	186.2	246.1	436.3
60%	39.8	79.7	156.4	295.4	172.9	279.3	369.1	654.4
80%	53.1	106.2	208.5	393.9	230.6	372.4	492.2	872.6
90%	59.8	119.5	234.6	443.1	259.4	419.0	553.7	981.6
100%	66.4	132.8	260.6	492.3	288.2	465.6	615.2	1090.7

[a] The number of acre estimates are based on production on high tunnels on 0.62 of an acre- the rest of the acre is for spacing between and around tunnels.

[b] Calculations are based upon USDA-ERS information for U.S. per capita food availability and Utah's estimated population from US Census 2010.

Table 6. The number of acres required to meet various numbers of customers for fresh produce with normal outdoor harvest intervals and extended harvest periods utilizing high tunnels.[a] [b]

Number of	Strawberries		Tomatoes		Squash		All Three	
Customers	4 wks	8wks	9wks	17 wks	13 wks	21 wks	outdoor	w/tunnel
1,000	0.02	0.05	0.09	0.18	0.10	0.17	0.2	0.4
1,500	0.04	0.07	0.14	0.27	0.16	0.25	0.3	0.6
2,000	0.05	0.10	0.19	0.36	0.21	0.34	0.4	0.8
2,500	0.06	0.12	0.24	0.45	0.26	0.42	0.6	1.0
3,000	0.07	0.14	0.28	0.53	0.31	0.51	0.7	1.2
3,500	0.08	0.17	0.33	0.62	0.36	0.59	0.8	1.4
4,000	0.10	0.19	0.38	0.71	0.42	0.67	0.9	1.6
4,500	0.11	0.22	0.42	0.80	0.47	0.76	1.0	1.8
5,000	0.12	0.24	0.47	0.89	0.52	0.84	1.1	2.0
5,500	0.13	0.26	0.52	0.98	0.57	0.93	1.2	2.2
6,000	0.14	0.29	0.57	1.07	0.63	1.01	1.3	2.4
6,500	0.16	0.31	0.61	1.16	0.68	1.09	1.4	2.6

[a] The number of acre estimates are based on production on high tunnels on 0.62 of an acre- the rest of the acre is for spacing between and around tunnels.

[b] Calculations are based upon USDA-ERS information for U.S. per capita food availability and Utah's estimated population from US Census 2010.

Estimating your market size

The Economic Research Service within USDA calculates the amount of food that was available for consumption each year. This is used as a proxy for the amount that is consumed each year. This is available for many products. There is a list of different types of products which gives you a spreadsheet with tabs for each. The one for fresh vegetables includes squash and tomatoes. The one for fresh fruit includes strawberries. http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm

Calculating the total acres needed for the market

1. Utah's population is 2,763,885 according to the 2010 census. Take the total population multiplied by the per capital consumption to get the amount consumed per year.
    a. 6.4 pounds per year x 2,763,885 = 17,835,350 pounds of strawberries consumed each year in Utah.
2. Take yearly consumption and divide by 52 to get weekly consumption
    a. 17,835,350 pounds / 52 = 342,987 pounds of strawberries consumed each week in Utah.
3. Per acre yield – 1,033 pounds produced per high tunnel multiplied by the number of high tunnels per acre (20) – gives a total of 20,660 pounds produced per 1 acre of strawberries in high tunnels.
4. There are 8 weeks in the market with high tunnels (8 weeks you would be harvesting and selling strawberries). You will also need to estimate the percent of the total market you will capture.
    a. % of market * weekly consumption * number of weeks / per acre yield = Acres needed to satisfy demand
    b. 1% * 342,987 * 8 / 20,660 = 1.3 (1.3 acres of strawberries would be needed to satisfy the demand).
    c. High percent of market captured increases the acres needed.
    d. Some evidence suggests that 5-10% might be the maximum percentage of the market that could be captured by local marketing channels (farmers market, CSA's etc.)

Calculate the number of acres needed for set number of customers

1. Use a set number of customers
    a. 1,000 customer
2. Find per capital consumption per week
    a. Annual consumption per capita divided by 52
    b. 6.4 pounds of strawberries per year / 52 = .124 pounds per person per week.
3. Find the acres needed for that many people
    a. Number of customers * weekly consumption * weeks in market / yield per acre = acres needed
    b. (1,000 * .124 *8)/20,660 pounds per acre = .05 acres needed.
    c. Multiply acres needed by tunnels per acre to get tunnels needed (.05*20=1). 1 tunnel of strawberries would be needed for 1,000 customers (this is total bodies so would need to estimate number of people per family).