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Horticulture Research

Winter Greens Production: Sales Revenue and Energy Costs

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Cooperators:

- **Lee Matteson and Rose Schick – Nevada**

Funding By:

CERES

Web Link:

http://bit.ly/pfi_horticulture

In a Nutshell

We compare the energy use of winter high tunnel production to the product revenue during the first season of operation.

- Greenhouses and high tunnels allow farmers to extend the growing season.
- Greenhouses and high tunnels can increase revenue per square foot.
- Managed properly, the increased revenue can offset the expense of additional infrastructure.
- In the first winter of production, Lee's Greens was able to keep their revenue above their energy costs.
- Propane was the bulk of the energy expenditure.

Project Timeline:

September 2013 – January 2014

Lee Matteson and Rose Schick (left) operate Lee's Greens in Nevada, Iowa. They use an insulated germination room (right) to start tomatoes and herbs for indoor production.

About the Cooperators

Lee's Greens, located in Nevada, IA, is owned and operated by Lee Matteson and Rose Schick. Matteson and Schick both have academic and practical backgrounds in indoor horticultural production; the winter of 2013-2014 was their first at Lee's Greens, their new joint venture. In addition to specializing in winter greens they will have early greenhouse tomatoes and in future years, outdoor production of fruits and vegetables.

Background

Greenhouses and high tunnels allow farmers to push the limits of Iowa's seasons, getting an early start and a late end to the production window. Practical Farmers and other agricultural research programs have studied the economic returns and production feasibility for a variety of crops in greenhouses (Worley, 2009-2012). Overwhelmingly, these studies find that using a high tunnel or greenhouse can increase revenue per square foot, and if managed properly the increased revenue can offset the expense of additional infrastructure (Butler, 2013; Chase and Naeve, 2012; Blomgren and Frisch, 2007; McLaskey, 2011).

Lee Matteson and Rose Schick of Lee's Greens are pushing their greenhouses harder than most, producing leafy greens for direct markets in central Iowa throughout the winter. The winter of 2013-2014 was Lee's Greens' first year in production, and was also the coldest winter (by summation of heating degree days) since 1978 (ISU, 2014). The biting cold coincided with an unprecedented spike in propane prices, which peaked at $4.70/gal in Iowa during January 2014, more than doubling any seasonal price for the last 10 years (USEIA, 2014).

Lee's Greens shared the revenue data from their first winter in production with Practical Farmers along with their monthly expenses for propane, water, and electricity used for their germination room and four greenhouses, which occupy over 12,000ft^2.

The objective of this project was to compare the energy use of winter high tunnel production to the product revenue during the first season of operation.

Method

Matteson and Schick provided Practical Farmers with their monthly revenue by crop and CSA shares as well as monthly energy spending data from September 2013 – January 2014. Propane was reported by bulk purchase, which lined up with monthly reporting of electricity, water, and revenue. The four greenhouses are drip irrigated and heated through the soil; electricity used at the farm was for the lights in the small, insulated germination room in the pack house.

Results and Discussion

For three of the five months data was reported, Lee's Greens revenue from leafy greens outpaced the expenses from water, electricity, and propane (**Figure 1**). The largest margin was in October, with $5,139 of net revenue. The largest month of revenue came in November, with $8,204 (**Figure 2**). Lettuce mix led sales every month, followed consistently by spinach and red kale; arugula and CSA shares sales each made a monthly standout in October and November, respectively. Sales of CSA shares in November are particularly notable because it is revenue for future produce deliveries; thus the high November revenue may have contributed to the lower reported revenue in December and January. Because this year was their first in production, the first month of reported expenses had no revenue – in future years that revenue gap will be filled.

The energy expenditures were dominated by propane purchases. **Figure 3** shows the magnitude of difference between propane, electricity, and water; the cost of propane in January was more than all the other energy expenditures combined. This significant jump in expense was due to the historically cold winter and high propane prices. In January 2014 Lee's Greens had to buy an additional 900 gallons of propane at $4.64/gal (**Figure 4**). If propane prices had not spiked as they did in January, Lee's Greens would have saved nearly $3,000 on their propane purchase that month.

Though not included in the analysis, Lee's Greens' delivery mileage totaled 6,170 miles, equal to $3,455 in federal mileage reimbursement ($0.56/mi). In terms of energy used, however, the propane use for the winter was an estimated 15 times that of gasoline for deliveries.

In future years the winter greens will be preceded by a tomato crop, which is expected to produce higher revenue with less energy cost than the winter greens, further increasing the annual revenue margin.

Figure 1

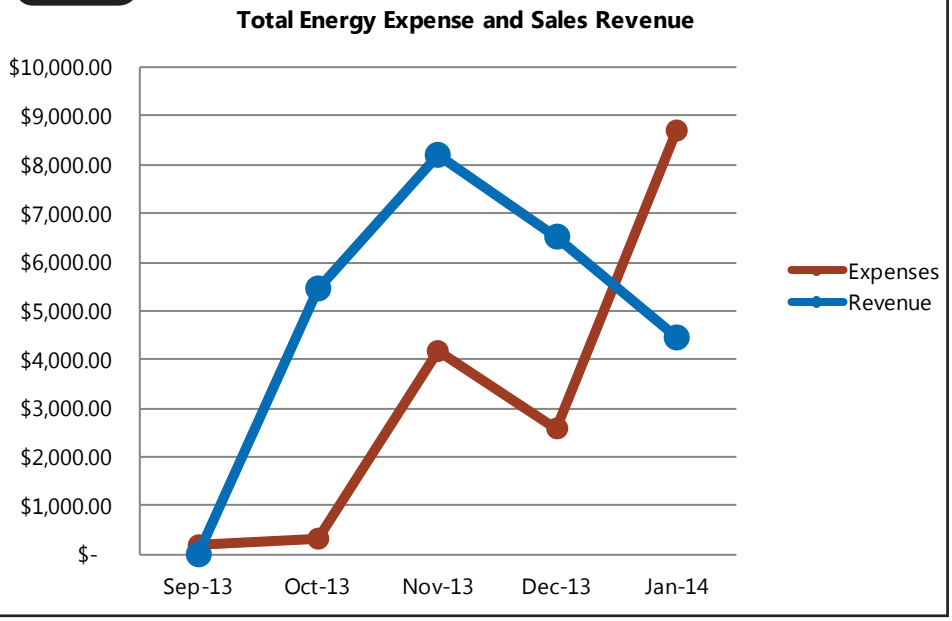
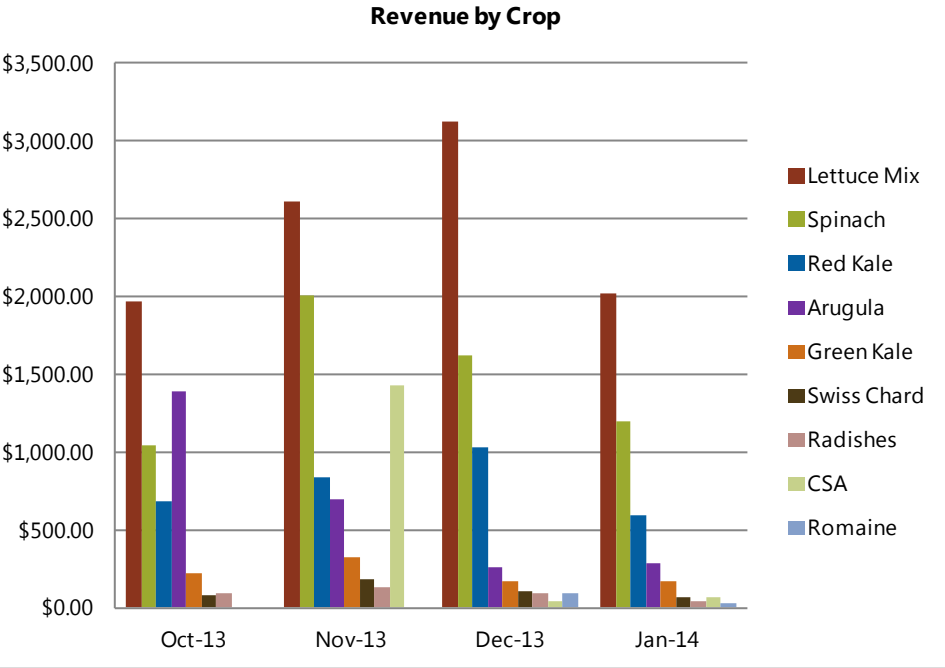


Figure 2



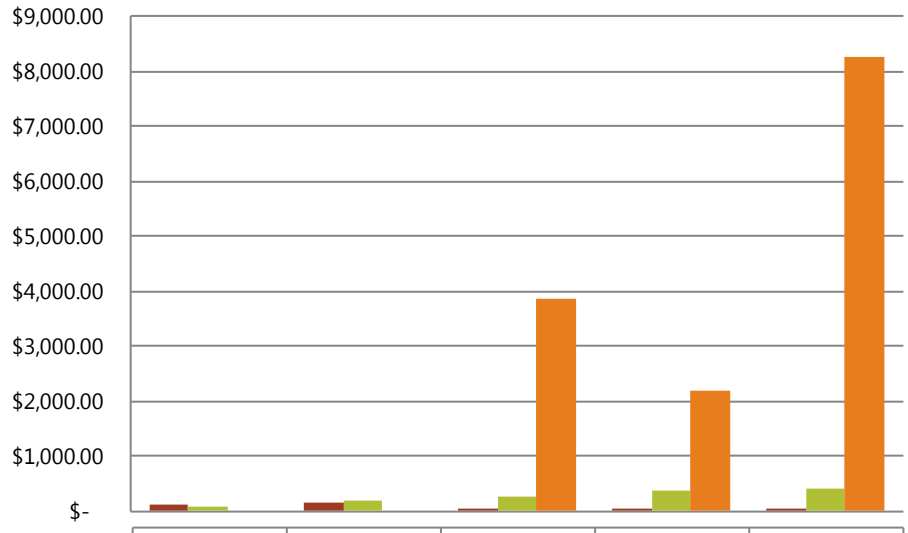
Conclusions and Next Steps

In their first winter of production, Lee's Greens was able to keep their revenue above their energy costs. Propane was the bulk of the energy expenditure, unsurprising during one of the coldest winters in Iowa's history coupled with record propane prices. "This year kind of threw us for a loop, with the high propane prices," said co-owner and grower Rose Schick.

"We did a couple little tricks to save some money on propane – we cleaned out some beds that were done and just left them cold, then delayed planting the early tomatoes by two weeks," said Matteson. "Our goal for tomatoes was to hit the first of May, giving us all of May and June before anyone else gets tomatoes. You can plant earlier [than February], but the cold and light will hold them back."

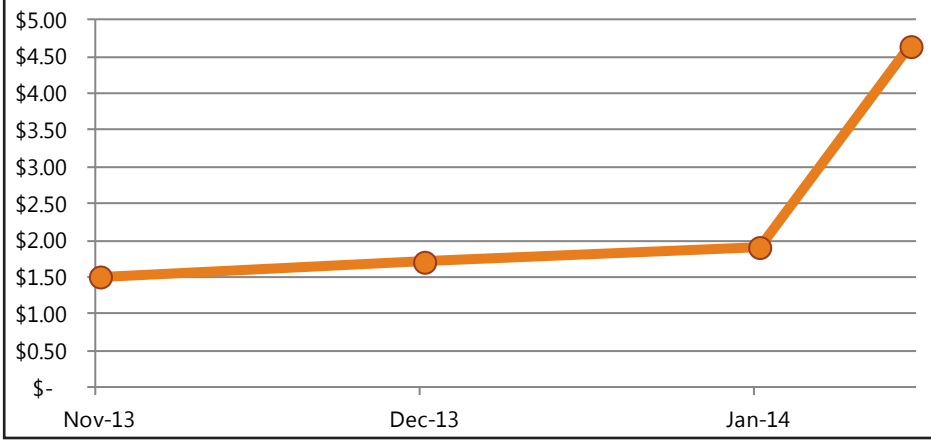
Another trick to efficient use of heating is the size and shape of the greenhouse. "With heating –the larger the house, the better," said Matteson. Lee's Greens' greenhouses are as wide as possible (34')

Figure 3



	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14
Water	$113.49	$138.79	$46.04	$29.18	$48.36
Electric	$72.20	$182.75	$252.47	$359.69	$393.71
Propane	$0.00	$0.00	$3,875.28	$2,198.01	$8,262.36

Figure 4



without requiring additional supports. "When the houses are smaller, the cold starts creeping in from the sides due to a larger surface area to volume ratio," said Matteson.

In their first year of production, Lee's is doing a few additional things to increase cash flow, including jams, herbs in the germination room and summer vegetables, but eventually they hope to move exclusively toward fruits and off-season greenhouse production. They're also trialing 15 different tomato varieties –grafted, artesian, heirloom and greenhouse varieties. Said Matteson, "We've struggled with heirloom varieties in the greenhouse. They get powdery mildew, they crack – you don't get nearly the production. Restaurants want them, so we're trying a few grafted varieties this year."

Schick and Matteson are unfazed by a complex bed rotation schedule and expanding production. "We can do it," said Schick, "we just need to see if it's going to make us any money!" To do that, they emphasize building relationships with chefs and getting chefs and buyers up to see their production. "It's important for chefs to understand how we're growing these greens in the winter and why we start running out. They can see where we've just harvested and that it will take some time to grow back. In September and October we were growing arugula in 1.5-2 weeks; from December to February it takes 4-6 weeks," said Matteson. Schick echoed, "In January you can really tell things won't grow as fast due to the darkness. That's the hard thing about working with chefs – just as you get them hooked on your product, things start slowing down and pretty soon we're saying, 'thanks for your business... hope you remember us next year!'"

Freshly harvested lettuce shares a bed with swiss chard (above). Below, beds have early tomatoes interplanted with lettuce, and green and red lettuce planted in the inside rows.

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PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs. If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or stefan@practicalfarmers.org.