Does Year-round Hoop House Production Pencil Out?

David S. Conner, Ph.D.
C.S. Mott Group for Sustainable Food Systems
Michigan State University

Presented to OSU Extension Small Farms Conference
February 16, 2008

the c.s. mott group
for Sustainable Food Systems at MSU

Acknowledgements

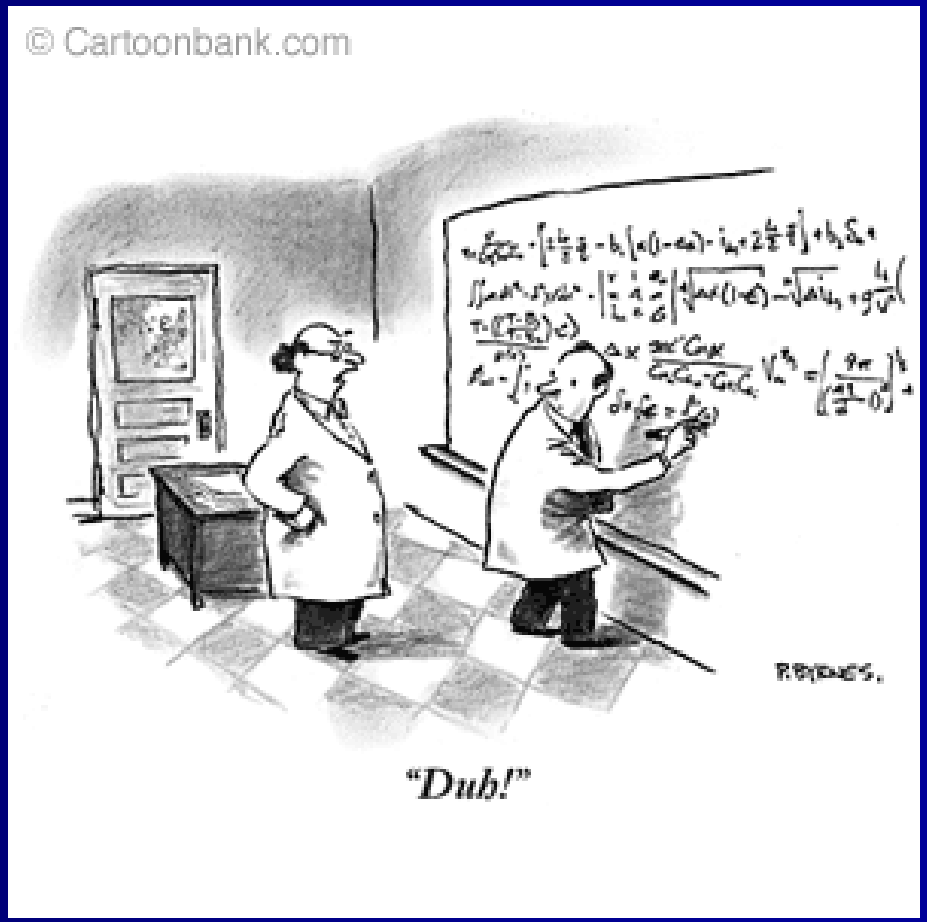
- This research was supported by the National Research Initiative of the USDA Cooperative State Research, Education and Extension Service, grant number 2006-55618-16922
- Thanks to conference sponsors and to OSU's Larry Lev and Linda Brewer!

Overview

- Description of Project
  - Research
  - Training
- Methods
- Results and Discussion
- Conclusions

Ask questions as we go!

If it does not make sense to you, it probably does not make sense to others either!



Project Description

- Began Fall 2006
- Provides hoop house (aka, high tunnel) and training to three farmers in each of three areas of Michigan– 9 total farmers
- Measures production costs and revenues (Enterprise Budgets)
- Measures consumer willingness to buy out –of-season local produce
- Documents farmer experiences

Project Description

Project Description

Research:

- Enterprise budgeting
- Farmers market-based research
- Farmer interviews

Training:

- Train/consult with farmers and create materials (Montri)
- Ongoing peer training: field days, etc.

Project Description

The Hoop House:

- Rimol Nor'easter*, 30 ft x 96 ft (2880 sq ft)
- Two ply plastic with inflation fan
- Roll-up sides
- Temperature controlled louvers
- Internal row cover, conduit frame

* Not an endorsement

Methods

"Supply Side": Do they pencil out?

- How soon does it pay for itself?
  - Hoop house as a whole: revenues, costs and labor → returns/pay off
- Which crops earn most?
  - Revenue per square foot-day

Methods

Enterprise Budgeting

- Monthly reports
- Log forms and summaries (third iteration)
- Record sales (units and $), hours (by category) and input costs

Methods

"Demand Side": Will consumers buy out-of-season produce?

Research with shoppers at three farmers markets (key outlet for all)

- Dot poster surveys
- Written surveys
- Focus groups

Methods

What can we learn from these farmers' experiences?

- End-of-project year interviews
  - Lessons learned
  - Keys to success
  - Obstacles

Results: Enterprise Budgeting

Construction Costs

- Hoop house kit (frame and plastic) lumber and conduit:~$10,000. Brought with grant $
- Common expenses
  - Electrical hookup: $110-$200
  - Water hookup: $200
  - Range of extra expenses: $200-$1,600

Results: Enterprise Budgeting

Construction Times

Range: 125-420 hours

Building experience and willing crew helps

Task	Dale	Tom
Frame assembly	155	105
Plastic construction/maintenance	97	25
Ground/site prep	48	36
Other	18	0
Total	318	166

Budgeting: Revenues

Revenues up to December 2007

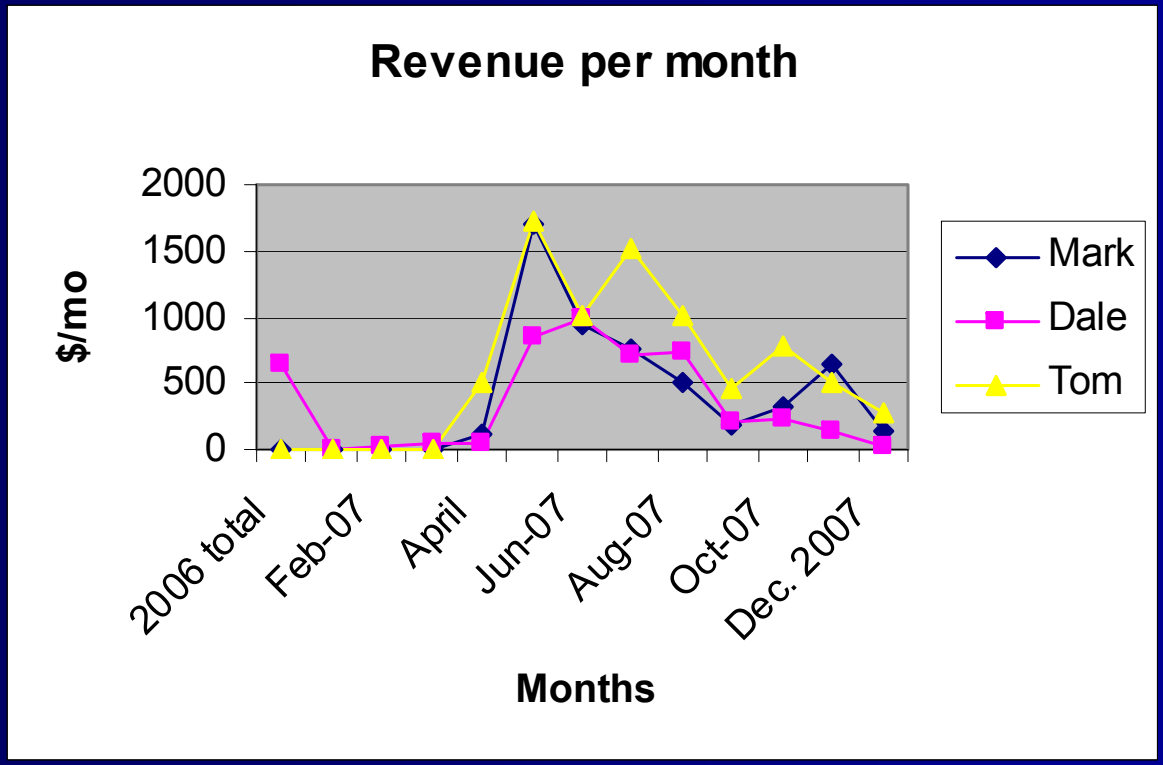
Note: excludes two outliers

- One used mostly for family/CSA
- Other did not grow much of year (family illness)

Farmer Revenues ($)	Total	2007 Total	2007 Avg/mo	Highest month
Max	7,816	7,816	651	1,734
Min	1,669	1,180	98	351
Average	3,733	3,547	296	1,085

Budgets: Revenue

- Three farmers' revenue data



Budgets: Costs

Includes:

- Special equipment (seeder)
- Seeds
- Compost
- Sawdust

Great variation depending on prior equipment, etc.
-Some are one-time, some are recurring.

**Does NOT include land, other fixed costs, or marketing costs

Budgets: Operating Costs

Farmers Operating Costs (up to December 2007), excludes construction

Farmer Costs	$ to date
Max	2,953
Min	229
Average	1,383

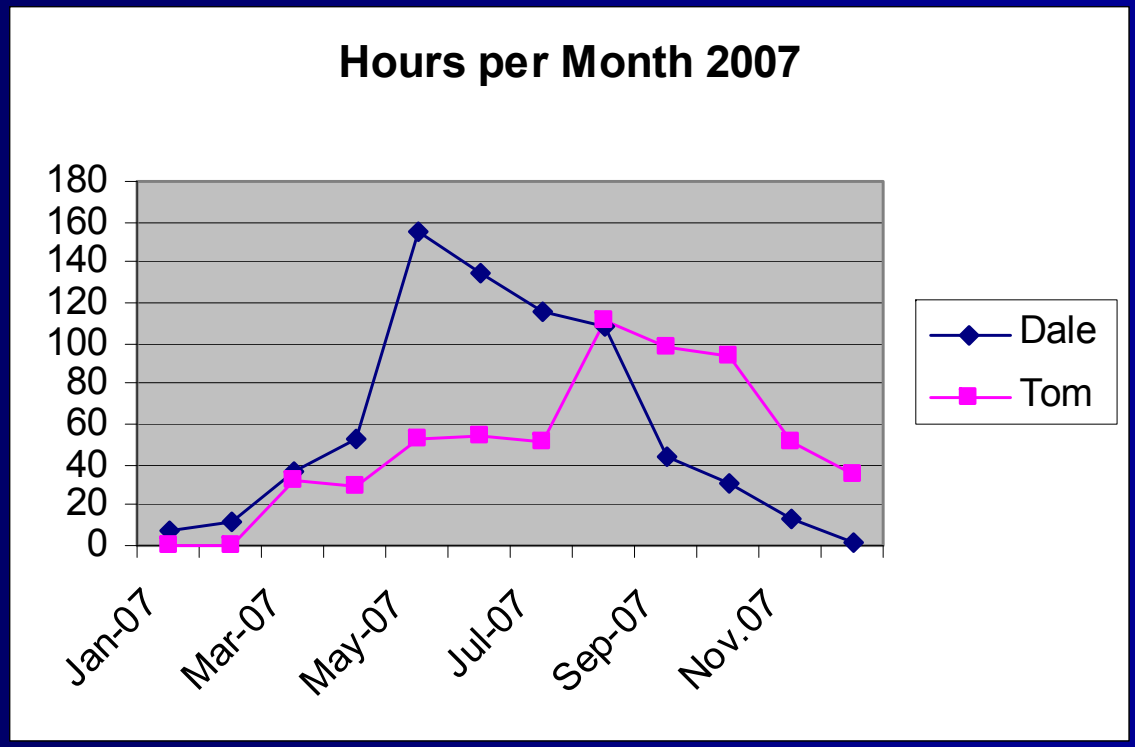
Budget: Labor

Breakdown of (owner-operator) labor hours For 2007

Labor Hrs	Jan-March	Apr-Jun	Jul-Sep	Oct-Dec*	2007 Total
Max	135	145	450	268	820
Min	2	8	15	8	66
Avg	68	42	147	115	355

Budget: Labor

Does HH spread labor over time?



Budgets: Profitability and Returns

Putting it all together...

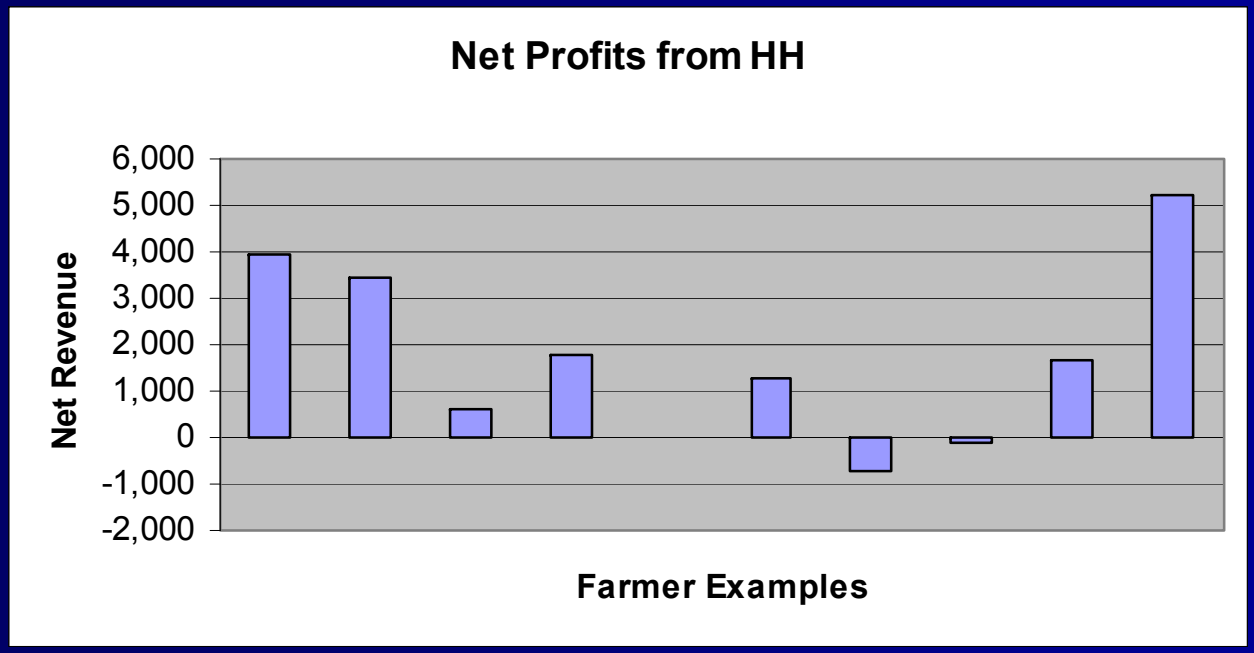
Net Revenue (returns to principle)

NR= Gross Revenue – Costs

Even ignoring O-O labor and construction inputs, a very mixed set of results!

Budgets: Returns

Best case, with current results, about 2-3 years to payoff



Returns

Three Farmer Example

Farmer	Revenue ($)	Cost ($)	Labor (Hr)	Net Revenue ($)	Gross Returns to Labor ($/Hr)	Net Returns to Labor ($/Hr)
Mark	5,310	1,386	820	3,924	6.47	4.78
Dale	4,626	2,953	808	1,673	5.73	2.07
Tom	7,816	2,593	609	5,223	12.83	8.57

Budgets: Revenue per Square Foot Day

Why per “square foot day” ???

- If all else equal a crop that
  - Is in the ground a shorter time
  - Takes up less space

  will make more money!

Rev/Sq Ft →Day-HH-yr

Given Rev/Sq Ft Day, if we assume maximum use of hoop house (350 days per year, 70% use of space), we can project out to "revenue per hoop house-year"

*Just an illustration to provide meaningful numbers

Some examples...

Example : Farmer Tom

Crop	Total Days	Total Rev	Sq. Ft	$/sq.ft/day	$/HH-yr
Beans	70	24	37.5	0.0091	6,451
Beets	80	18	75	0.0030	2,117
Beets	80	12	75	0.0020	1,411
Beets	158	307	75	0.0259	18,250
Chard	175	104	37.5	0.0158	11,182
Cucumbers	129	225	75	0.0232	16,373
Daikon	100	52	75	0.0069	4,892
Eggplant	88	22	75	0.0033	2,352
Eggplant	170	249	75	0.0195	13,780
Pole Beans	82	166	75	0.0270	19,045
Turnips	107	20	75	0.0025	1,759

Example : Farmer Tom

Statistic	Crop	$/HH-yr
Max	Pole Beans	19,045
Min	Beets	1,411
Avg		8,874

Quick Discussion of Budget Results

- Huge variation in results
  - Quality of data/dedication to record keeping
  - Intensity of use
  - Crops' value to enterprise
- Some farmers have lost money!
- Pay back in ~3 years in best case (assuming same results in years 2-3)

But will people buy hoop house produce?

Demand Analysis

Research at three farmers markets: Will people patronize early and late season markets if fresh local produce is available?

Demand Analysis

Recall three methods:

- Dot poster surveys
- Written surveys
- Focus groups

Three Markets (Summer 2007)

- Ann Arbor, Sweetwater (Muskegon), Sault Ste Marie


KERRYTOWN
DxA²
GMC

Market Results: Dot Posters

What is the earliest month you attended this market in 2007?

Market	Jan or Feb	March or April	May or later	Total
AA	74	76	66	216
Sweetwater	21	12	69	102
Sault	n/a	n/a	100	100

Market Results: Dot Posters

If local produce was available what is the earliest month you would be willing to come to this market?

Market	Jan or Feb	March or April	May or June	Total
AA	163	69	5	237
Sweetwater	81	21	3	105
Sault	56	24	20	100

Market Results: Dot Posters

What is the latest month you attended this market in 2006?

Market	July or Aug	Sept or Oct	Nov or Dec	Total
AA	6	58	155	219
Sweetwater	8	33	34	75
Sault	3	27	20	50

Market Results: Dot Posters

If local produce was available what is the latest month you would be willing to come to this market?

Market	July or Aug	Sept or Oct	Nov or Dec	Total
AA	1	17	222	240
Sweetwater	0	5	95	100
Sault	0	15	85	100

Market Results: Written Surveys

- Administered at all three markets
- N=195
- Questions on
  - How much will you pay for HH produce
  - Items you want to buy/not
  - Important attributes

Market Results: Written Surveys

Presented with option of buying salad greens (1) grown outside of the state, or (2) produced by a local farmer in hoop house).

The two items are the same in size, quality and appearance. Suppose item (1), cost $2.00 per bag. What is the most you would pay for item (2), local hoop house produce?

Market Results: Written Surveys

Pay for HH grown salad greens?

Response	Frequency	%
Exactly $2.00	7	4
$2.10	10	5
$2.50	7	4
3	37	19
>$3.00	96	49
Do not like/buy	37	19

Market Results: Written Surveys

Consider the answer you gave (the amount you'd pay for local hoop house grown salad greens). On what proportion of your vegetable purchases would you pay that amount?

Market Results: Written Surveys

Proportion of produce you'd pay previous amount

Response	Frequency	%
A few items	18	9.2
Many	72	36.9
Most	58	29.7
All	32	16.4

Market Results: Written Surveys

Items Most Preferred to buy:

- Tomato (85%)
- Spinach (70%)
- Carrot (70%)

Not want to buy

- Radishes (26%)

Market Results: Written Surveys

Most important attributes (scale 1-10, mean response)

1. Michigan grown (7.88)
2. Organic (7.39)

Median for MI-grown =10!

Greater than grown within 20 or 100 miles

Market Research: focus groups

Key themes

Importance of these outlets for foods consumers want (fresh, quality, safe)

Dedication:

- Many buy most food there
- (Indoor market) only ice storm will keep away

Market Research: Recap

- People say they'll buy
  - Attend markets, spend money, pay premium on many items
- People are buying: Mark takes pre-orders through much of season
- Early crops keep customers through season

Farmer Adoption: How did it go?

- Lessons learned
- Keys to success
- Obstacles

Farmer Adoption

Benefits of Hoop houses

- Ability to harvest early and late in the season
- Providing cash flow and productive labor opportunity in otherwise slow times
- Pleasant work environment in cold season

Farmer Adoption

Site and Soil Preparation

- Relatively level
- Well-drained ground
- Full sunlight
- Proximity to water and electricity sources
- Drip tape saves much watering time
- Good fertility and control of weeds

Farmer Adoption

Key Differences from Outdoor Production

- Everything grows faster (including weeds): use more seeds, water and fertility inputs
- Using tractors or tillers more difficult/not feasible : more handwork
- Produce higher quality; less damaged by wind, splash, and pests
- Different weed and pest pressures (e.g., chickweed, grasshopper, rodents)

Farmer Adoption

Whether to Buy and How to Use

- "Learning curve"
- Know your markets and what you can sell.
- Use limited hoop house space wisely: all crops may grow well, but...

Farmer Adoption

Key points:

- Learning curve
- Soil and pests
- Know markets

Now for the Big Finish!

Conclusions

- ✓ Market/demand not a problem
- ✓ Some farmers/some crops made money
- ✓ Very wide variation in results
- ✓ Best data come from best record keepers/most diligent report makers: same as best farmers?

Conclusions

Big investment, need to maximize potential

“Free” hoop house may have decreased urgency for some farmers

Question for next year: if you had to buy it, would you have?

Thank you!

David S. Conner, Ph.D.
C.S. Mott Group for Sustainable Food Systems
Department of CARRS
309 Natural Resources Bldg
Michigan State University
East Lansing MI 48823

Voice: 517-353-1914
Fax: 517 353-3834
Email: connerd@msu.edu
http://www.mottgroup.msu.edu