

Farm and Agribusiness Management

-Lecture 10 -Whole Farm Planning

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Introduction

- ▶ Farm's are multiproduct enterprises
- ▶ This necessitates whole farm planning
- ▶ Steps involved in whole farm planning
- ▶ Budgeting and whole farm planning
- ▶ Using linear programming to determine enterprise/activity combination
- ▶ short vs long-run budgeting

Whole farm plan

summary of the production to be carried out on the entire farm and the resources needed to do it.

- ▶ fertilizer
- ▶ seed
- ▶ pesticide
- ▶ feed rations

- ▶ List of activities/enterprises and desired levels of production.
- ▶ Draw a map of your farm and mark-in the enterprises/activities on the map.
- ▶ Including expected costs and returns results in a whole farm budget

The planning procedure

6 steps

1. determine objectives and specify goals
2. inventory of physical, financial and human resources
3. identify enterprises and technical coefficients (how much can you produce with what resources)
4. Estimate gross margins for each enterprise
5. Choose a plan- feasible enterprise combination to meet goals
6. Develop a whole farm budget (projection)

Objectives and goals

- ▶ Main objective profit maximization subject to restrictions
- ▶ Goals should be specified in terms of crop yields, livestock production rates, costs of production, net income, etc.

Inventory resources

Write a list for this!!

- ▶ land
- ▶ buildings
- ▶ machinery
- ▶ capital
- ▶ labor
- ▶ management
- ▶ other

Identify enterprises and technical coefficients

- ▶ How much of a resource is required to produce 1 unit of an enterprise activity?
- ▶ How much fertilizer is required to produce 1 t of wheat?

Example:

1 beef cow might need 2 acres of pasture, 6 hours of labor and \$ 679 of operating capital.

Estimate gross margin per unit

- ▶ Gross margin is the difference between gross income and variable costs
- ▶ Maximizing gross margin equivalent to maximizing profit or minimizing costs in the short-run (fixed costs don't change)

Choose enterprise/activity combination

- ▶ Maximizing gross margin subject to resource constraints is a linear programming problem
- ▶ Widespread availability of Solver add-in in Excel led to adoption of Excel in farm planning
- ▶ Prior to that specialized optimization software was needed
- ▶ Solver no longer shipped with Excel so alternatives are needed SciPy and Jupyter give us a widely available alternative

Prepare the whole farm budget

This can be used to

1. estimate expected income, expenses and profit
2. estimate cash inflows, cash outflows and liquidity
compare effects of alternative farm plans evaluate
effects of expanding or changing farm plan
3. estimate need for and availability of resources
4. communicate farm planner to lenders, landowners,
partners or stockholders

Example

Aim

Choose a combination of crops and livestock to maximize gross margin for the farm. For agronomic reasons, the operator wishes to carry out a crop mix that does not include more than 50 percent of the Class A cropland planted to cotton.

Inventory

Resource	Amount
Class A cropland	520 acres (no more than 50% in cotton
Class B cropland	200
Pasture	380
Buildings	Hay and cattle shed
Labor	3700 hours annually
Capital	adequate
Machinery	Adequate
Management	Capable
Other limitations	Hay cannot be sold

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Resource	Quantity	Class A cropland			Class B cropland		Livestock	
		Cotton	Soybean	Corn	Soybeans	Corn	Beef Cows	Stocker Steers
Class A cropland	520	1	1	1				
Class B cropland	200				1	1	0.2	
Pasture	380						2	2
Labor (hrs)	3700	4	1.8	2.1	1.8	2.1	6	4
Operating capital		490	364	417	274	370	679	992

Estimating gross margins

	Class A cropland			Class B cropland		Livestock	
	Cotton	Soybeans	Corn	Soybeans	Corn	Beef cows	Stocker Steers
Yield	780	40	105	28	80		
Price	0.8	12	5	12	5		
Gross income	624	480	525	336	400	881	1050
Total variable costs	490	364	417	274	370	679	992
Gross margin	134	116	108	62	30	202	58

Linear programming Tableau

	Units	Class A cotton	Class A soybeans	Class A corn	Class B soybeans	Class B corn	Beef cows	Stocker steers	Type	Limit
Gross margin	\$/unit	134	116	108	62	30	202	58	Max	
Class A Land	acre	1	1	1	0	0	0	0	LE	520
Class B Land	acre	0	0	0	1	1	0.2	0	LE	200
Pasture	acre	0	0	0	0	0	2	2	LE	380
Labor	acre	4	1.8	2.1	1.8	2.1	6	4	LE	3700
Rotation Limit	acre	1	0	0	0	0	0	0	LE	260

- ▶ Static optimization in industrialized agriculture
- ▶ Household models in developing world agriculture
- ▶ Biophysical simulation
- ▶ Emerging approaches (hybrid static dynamic, combine with farm surveys, multicriteria)

Source: Michael J Robertson, David J Pannell and Morteza Chalak Whole-farm models: a review of recent approaches, AFBM Journal 9(2) 2012.

Farming systems approaches

- ▶ Farming systems research (FSR)
- ▶ Farming systems models
- ▶ Criticized for being expensive
- ▶ Popular in the 80's and 90's
- ▶ Seem to have fallen out of favor
- ▶ Possibly replaced by Randomized Control trials and field experiments

Using Farm Logs

12/5/2016

FarmLogs - Test

Test



2016 CROPS

all crops +

CN Canola
23.6 ac - [edit](#)

SIZE

23.6 acres

LAT/LNG

35.78684, -96.85049

[show more...](#)

Rainfall

Heat Units data is unavailable for this location

<https://app.farmlogs.com/fields/1643311>

1/7

- Test.pdf

Activities

12/5/2016

FarmLogs - Log activity

Choose Activity...



I

Irrigating

T

Tilling

P

Planting

S

Spraying

H

Harvesting

F

Fertilizing

- Log activity.pdf

<https://app.farmlogs.com/activity/log>




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Choices

12/5/2016 FarmLogs - Log activity

at ^

CROP YEAR 2016 filter by commodity... ☐ select all

	A	<input type="checkbox"/>
	B	<input type="checkbox"/>
	Test	<input type="checkbox"/>

[Download](#)

Tractor specifications

12/5/2016

FarmLogs - Log activity

New Tractor

×

Name

Horsepower

Fuel Capacity

Make

Model

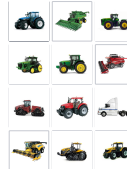
Year

Value \$

Rent or own? ☐ I own this tractor
☐ I rent this tractor

Notes

Icon



- Log activity-Tractors.pdf

<https://app.farmlogs.com/FacticityLog>

1/1

Farm Accounts -Slick pie

<https://www.slickpie.com/>

- ▶ Free plan
- ▶ automated data entry (paid plan)
- ▶ online invoicing
- ▶ automatic payment reminders
- ▶ online billing
- ▶ bank reconciliation
- ▶ document upload
- ▶ financial reports
- ▶ tax management
- ▶ multi-device compatibility
- ▶ transaction history
- ▶ security
- ▶ open API (allows integrations)

Whole farm budget

- ▶ Monetary and tabular representation of whole farm plan.
- ▶ Covers all enterprises (activities)
- ▶ Can be short or long-run

Partial Budgets

1. What new additional costs will be incurred?
2. What current costs will be reduced or eliminated?
3. What new or additional revenue will be received?
4. What current revenue will be lost or reduced?

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Partial budget	
Alternative:	
Additional costs:	Additional revenues:
Reduced revenue:	Reduced costs:
A. Total additional costs and reduced revenue	B. Total additional revenue and reduced costs
Net change in profit (B minus A) _____	

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Partial budget	
Alternative: Add 100 beef cows on 200 acres rented land and convert 20 acres crop to feed	
Additional costs: Fixed costs Interest on cows 5625 Variable costs Pasture rent 7000 Production costs 67900 Reduced revenue: Soybean sales 20 acres 6720	Additional revenues: 10 cull cows 9700 33 heifer calves 30200 45 steer calves 48200 Reduced costs: soybean production 20 acres 5480
A. Total additional costs and reduced revenue <u>87245</u>	B. Total additional revenue and reduced costs <u>93580</u> <u>87245</u> Net change in profit (B minus A) 6355