Farm economics of EUBerry

EUBerry 2014 Final Meeting

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SEVENTH FRAMEWORK PROGRAMME

EUBerry

Outline

- Why knowledge of economic viability?
- Definitions: gross margin, cost price and farmers income
- ***EUBerry*** Economic viability of new production methods
  - Selection of countries
  - Selection of innovative production methods
  - Calculations: effect on Marginal gross margin or income
- Results
  - Ex post: effects of some interesting innovative production methods on economic viability
- General conclusions

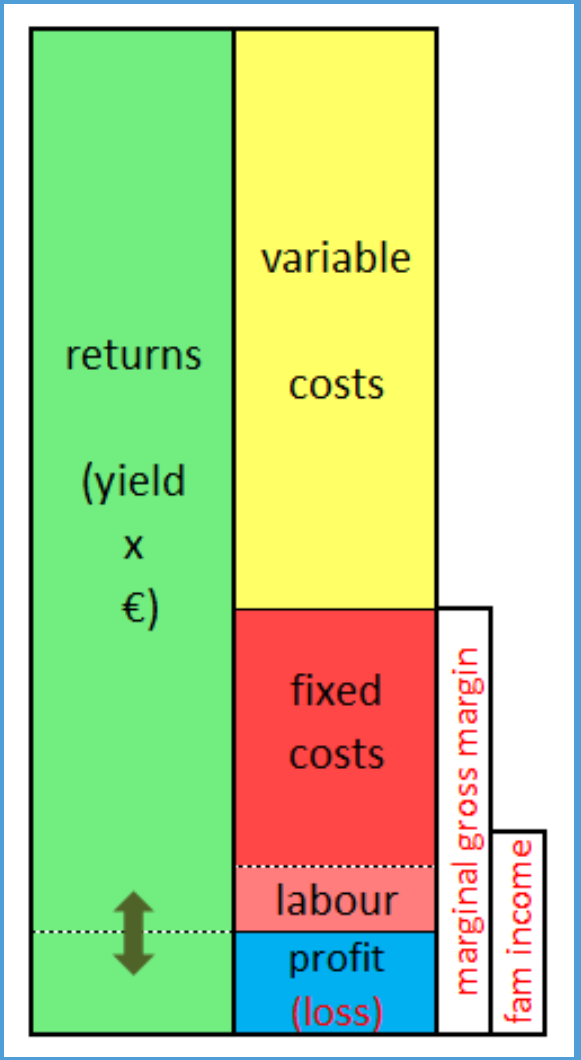
Why knowledge of economic viability?

- Ex ante (2012): Knowledge of critical conditions for economic profitability may help researchers to develop systems that farmers will implement.

- Ex post (2014): Economic profitability is a condition for implementation of sustainable culture systems by the European fruit growers.

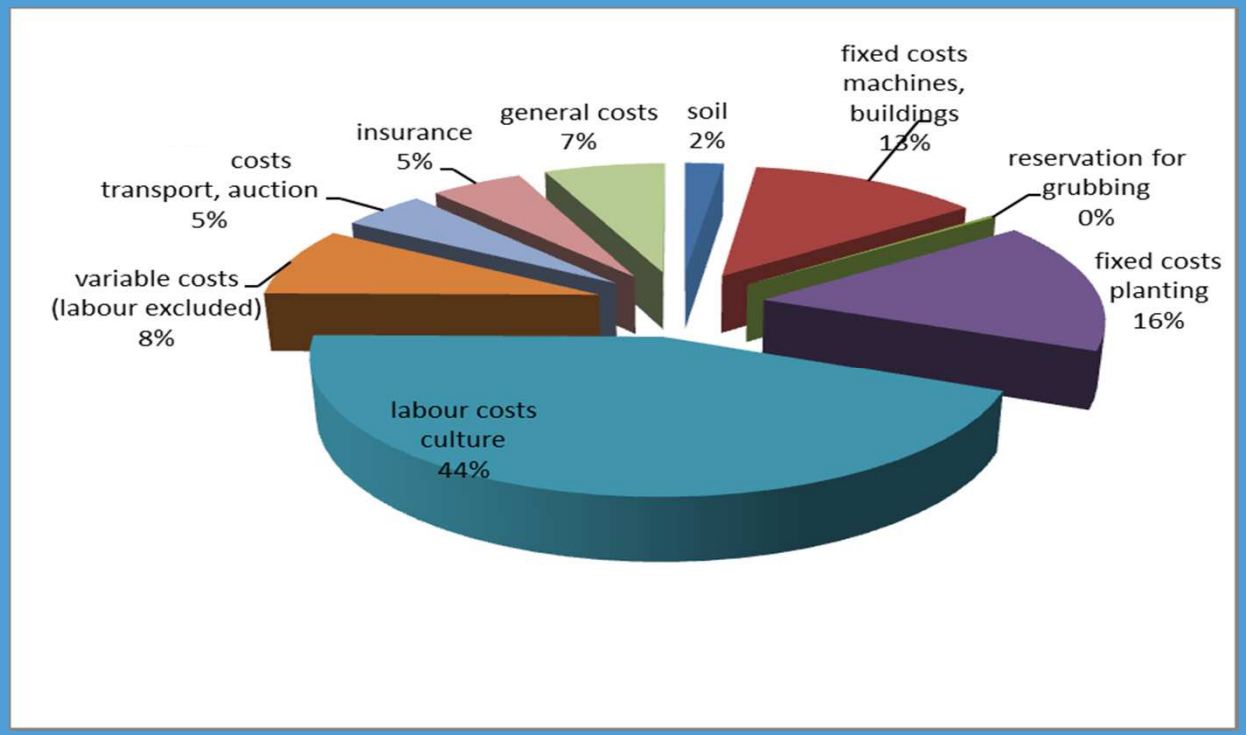
Cost price and growers income

- Returns:
  - Yield x price
    (quality very important)
- Variable costs:
  - Costs for materials/hours, used for this culture. Variable costs depend of area (e.g. plants, fertilizer, fuel, crop protection, hired labour, et cetera)
- Fixed costs:
  - Independent of this culture (e.g. depreciation and interest for machines & buildings, family labour)
- Cost price:
  - (var. costs + fixed costs)/kg sold



Cost price of blueberries in The Netherlands

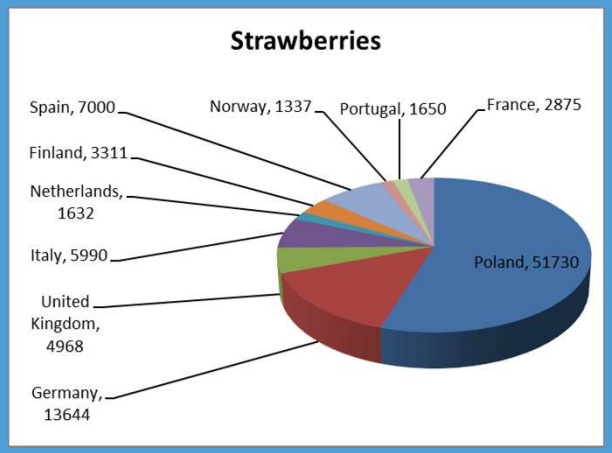
- Mayor costs are for labour (fixed and variable) and fixed costs for planting and for machines & buildings
- Variable costs (labour excluded) 8%, but at short time affected by fruit grower

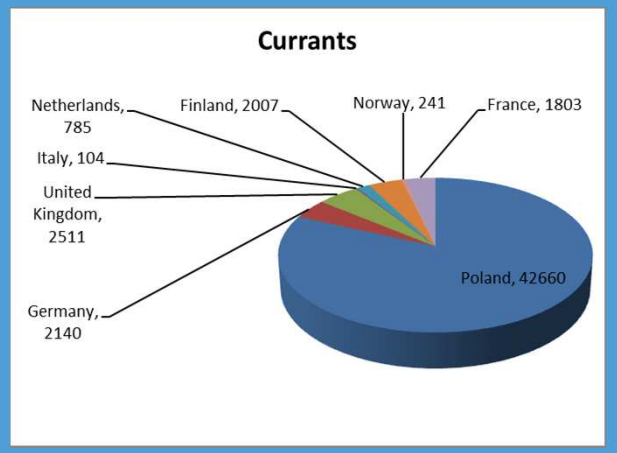


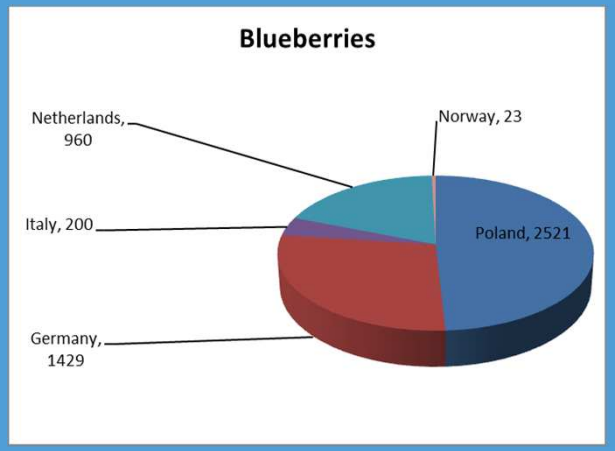
EUBerry: Selection of countries for economic calculations

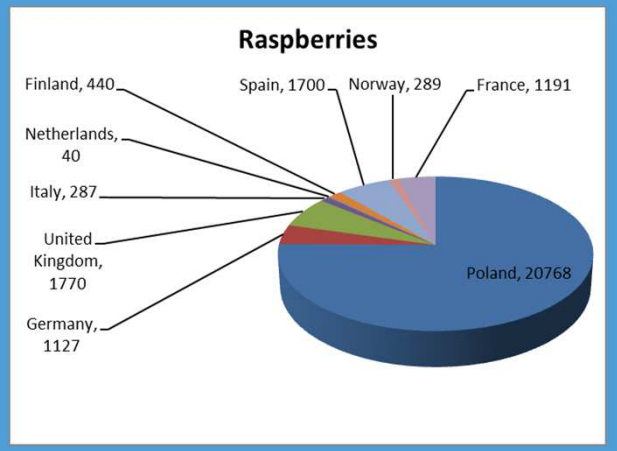
Criteria:

- Production areas of berries in the countries, participating in the EUBerry project (Source: FAO, 2012)
- Geographical distribution
- Availability of data









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EUBerry: Economic viability of new production methods; Selection of innovative production methods

Based on questions to the Work Package leaders:

1. New varieties with reduced water requirement (raspberries)
2. Varieties for easier picking (raspberries)
3. Low residue level (strawberries)
4. Reduction of water & nutrients use (straw-, rasp- and blueberries)
5. Effect of ozone on shelf-life (straw-, rasp- and blueberries)
6. In vitro propagation (breeding) (straw-, rasp- and blueberries)

Season extension:

7. LED lighting in tunnels (strawberries and raspberries)
8. mist equipment (spring frost prot.) (straw-, rasp- and blueberries)
9. tunnels/coatings (straw- , rasp- and blueberries)
10. covering or mowing plants (straw- , rasp- and blueberries)

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EUBerry: Economic viability of new production methods

Calculation of Marginal gross margin

example: Blueberry in The Netherlands

Yield -/- losses (kg per ha)	7.650		
Returns (€/ha)		**€**	**24.863**
Fertilizers	... ...		
Fuel, *et cetera*	... ...		
Interest on working capital	... ...		
variable costs		€	9.328
Gross margin (€ per ha)		**€**	**15.535**
Temporary labour	... ...		
Transportation, *et cetera*	... ...		
marginal costs		€	498
Marginal gross margin (€ per ha)		**€**	**15.037**
founding costs planting	... ...		
fixed assets, *et cetera*	... ...		
fixed costs		€	11.700
Labour income berry grower (€ per ha)		**€**	**3.337**

EUBerry: Economic viability of new production methods

Calculation of Marginal gross margin:

Marginal gross margin Bleuberry

EUBerry

country	The Netherlands
Crop	Bleuberry
Variety	....
Culture system	Planted in the ground, no covering, mechanical picking
	Single rows, distance 3.00 x 1.00 m; 3.333 plants/ha.
Age	year 6 (full production)

Item	**source of data**	**Explanation / calculation**	**per ha**
calculation of returns			
Total yield (kg per ha)	KWIN 2009/2010	Quantity at bushes	8,000
Harvested (kg per ha)	KWIN 2009/2010	Total yield - losses during harvest	6,800
Sold (kg per ha)	Assumption 1	kg not stored + (kg stored - storage loss)	6,800
Price (€ per kg)	KWIN 2009/2010	Average price	€ 3.25
area based subsidy (€/ha)			€ -
Returns (A)			**€ 22,100**
Calculation of gross margin			
Material use (culture)	KWIN 2009/2010	see 'Material use during culture'	€ 3,500
Weather insurance	Assumprion 6	see 'Insurance extreme weather'	€ 828
Delivery costs	Assumption 2	(kg sold x crate charges + returns x auction commission)	€ 854
interest on working capital during culture	Assumption 3	Costs for (Material use (culture)+Weather insurance+Temporary labour for culture) x (Interest rate x Asset turnover/12)	€ 65
other calculated costs			€ -
Total calculated costs (B)			**€ 5,247**
Gross margin (A – B = C)			**€ 16,853**
Calculation of marginal gross margin			
Temporary labour			
for culture	€ 14.00	€/hr; 0.0 hours	€ -
for harvesting	€ 14.00	€/hr; 3.4 hours	€ 48
for grading	€ 14.00	€/hr; 12.75 hours	€ 179
Transport	Assumption 4	kg sold x transport charges (€/kg)	€ 272
Cold storage	Assumption 4	kg in storage x storage charges (€/kg)	€ -
interest on working capital post harvest	Assumption 5	(kg in storage x price + Part in storage x harvest; temporary labour+) x (Interest rate x Asset turnover/12)	€ -
Marginal costs (D)			**€ 498**
MARGINAL GROSS MARGIN (C - D)			**€ 16,355**

Assumption 1	**kg sold**	
losses during harvest	15%	
Part in storage	0%	
Losses during storage	0%	
Assumption 2		
crate charges	€ 0.02	/kg
auction commission	3.25%	
Assumption 3		
Interest rate	6%	
Asset turnover	3	months
Assumption 4		
storage charges (€/kg)	€ -	untill December inclusive
	€ -	/ month after December
transport charges (€/kg)	€ 0.04	/kg
Assumption 5		
storage period	0	months

Labour demand harvesting & grading		
picking speed	600	kg/uur
% fixed labour for picking	70%	
add. fixed labour demand	5.0	hr/ha
grading speed	400	kg/hr
% fixed labour for grading	25%	
add. fixed labour demand	0.0	hr/ha

Labour demand	**explanation / calcul.**	**hours/ha**
culture; temporary labour	see 'Labour demand for culture'	0.0
culture; fixed labour		155.0
harvest; temporary labour	6800 / 600	3.4
harvest; fixed labour	6800 / 600	12.9
grading; temporary labour	6800 / 400	12.8
grading; fixed labour	= 0.25 x 6800 / 400 hrs	4.3

Material use during culture	**per ha**	**yield**
manuring / fertilization	€ 250	price
Crop protection 1st year	€ 350	
Crop protection other years	€ 700	
Weed control	€ 350	
Fuel & engine oil	€ 100	
Energy (not fuel)	€ 150	
Bees / bumblebees	€ 600	
Wood chips	€ 800	
Others	€ 200	
Total material costs	€ 3,500	

Labour demand for culture	**fixed hr/ha**	**temporary hr/ha**
manuring / fertilization	40.0	0.0
Weed control - mechanical	5.0	0.0
Weed control - chemical	10.0	0.0
Crop protection	10.0	0.0
bird control	10.0	0.0
winter pruning (removal incl.)	80.0	0.0
summer pruning	0.0	0.0
...	0.0	0.0
...	0.0	0.0
Total	155.0	0.0
Total labour demand for culture		**155**

Assumption 6:		
Insurance extreme weather		
Adviced sum to be insured:		
returns:		€ 27,500
plantings:		€ 32,500
premium extreme rain / drought *	0.70%	€ 192.50
**	0.65%	€ 390.00
premium hail ***	5.52%	€ 1,518.00
* insurance concerns returns plant.		
*** premium first year (no bonus/malus)		
total premium		€ 2,100.50
state subsidy (maximum)	60.60%	
premium after subsidy		**€ 827.60**

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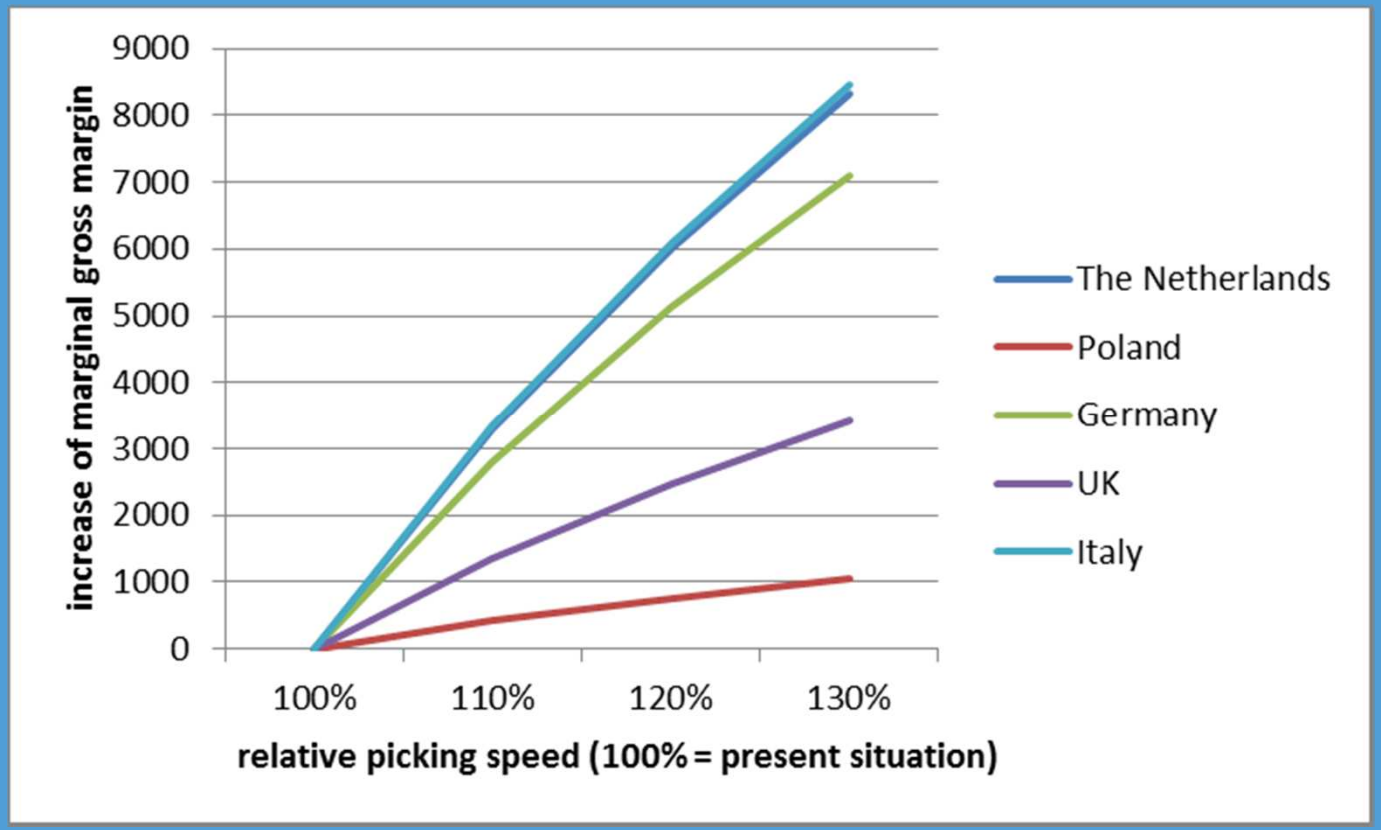
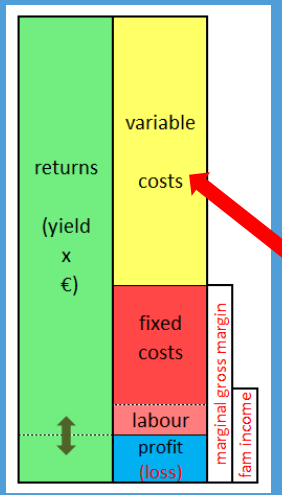
Effect of new production methods on economic viability

New raspberry varieties for easier picking

- Ex ante: economic effect depends on yield and wage for hired labour





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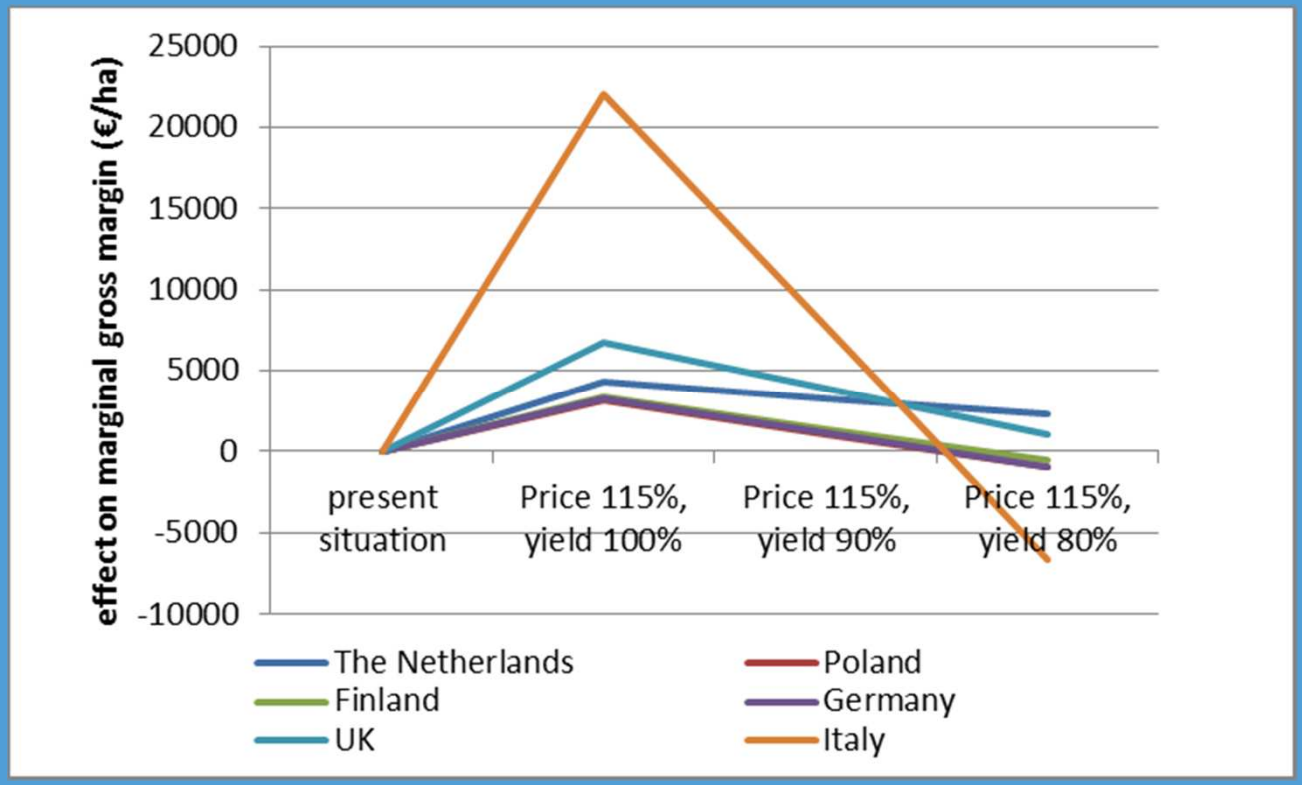
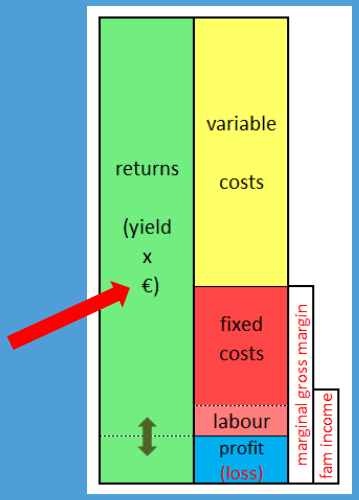
Effect of new production methods on economic viability

Ex ante: Low residue level (DSS) in strawberries

Economic effect depends on quality (price) and yield





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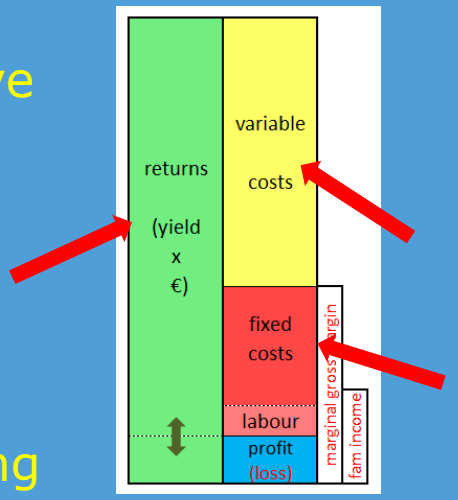
Effect of new production methods on economic viability

Ex post: Results Low Residue Level (DSS) in strawberries

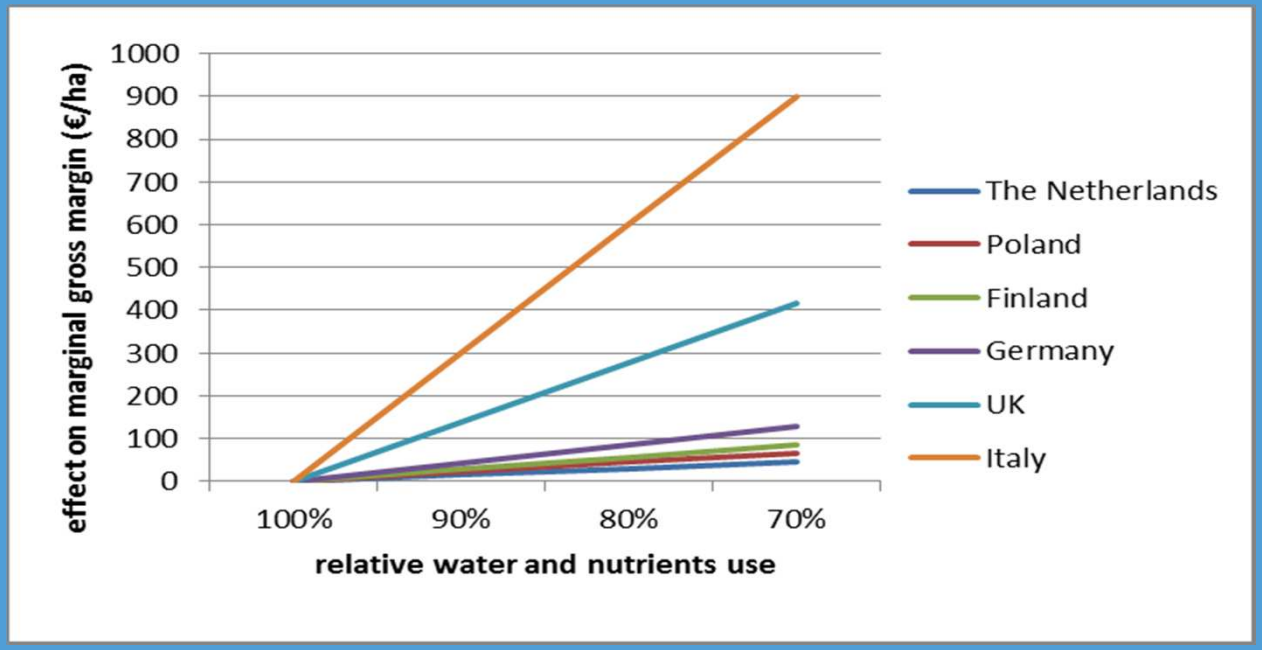
- Reduction of # sprayings (- 1.3), against Botrytis fruit rot (e.g. reduction of 15 g/ha Switch)
- < 5 residues & < 30% or 50% of the MRL cumulative
- Same yield (increased but not significant)
- Effect on variable and fixed costs:
  - DSS (€ 150/year/farm)
  - Additional labour demand for health monitoring
  - Vacciplant (no pesticide) => # sprayings not reduced
- Effect on selling price? (not in short-term, reference meets standard)
- Effect on licence to produce / licence to deliver, not on MGM or income



Effect of new production methods on economic viability

Reduced water and nutrients use

- E.g. in strawberries, but the same in raspberries and blueberries



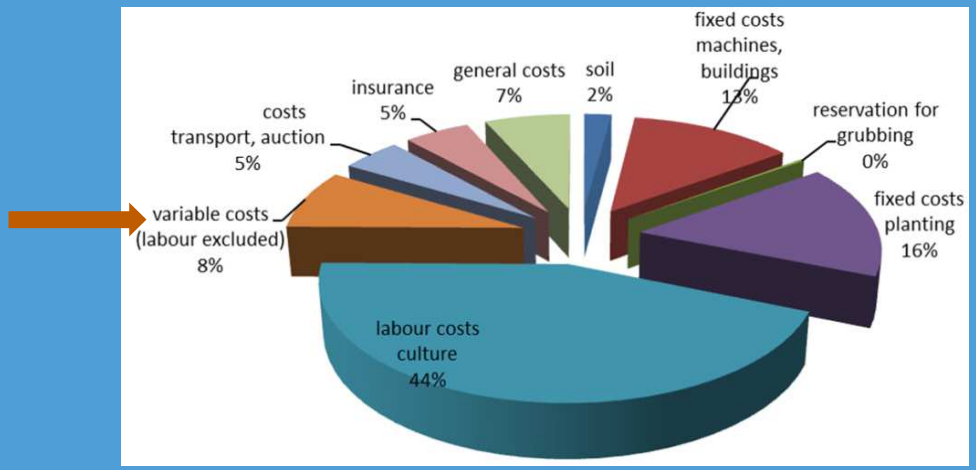
Ex ante:

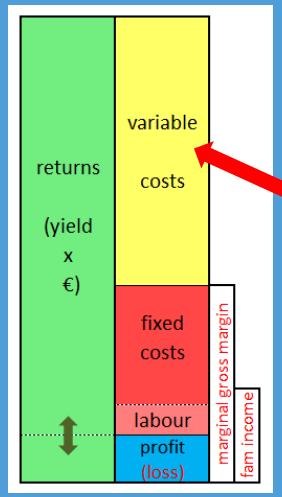
- yield and quality may not decrease
- Additional fixed costs must be very low

Effect of new production methods on economic viability

Ex post: Results reduced water and nutrients use

- No data of experiment results, but minor effect on economic viability



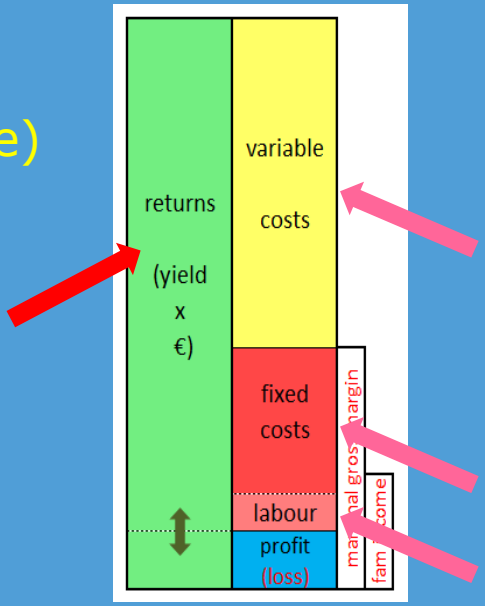


- Selling price, marginal gross margin and farmers income not affected
- More important: effect on Licence to produce

Effect of new production methods on economic viability

Ex-post: season extension using LED

- studies in Norway (tunnels) and Poland (greenhouse)
  - Norway:
    - + 10-13% yield on autumn crop (estimation + 400 kg/ha)
    - (more if heating had been added)
    - increased Brix° value
  - Poland:
    - no significant effect on yield
    - no relevant season extension



Effect of new production methods on economic viability

Ex-post: season extension using LED

- Estimation of additional returns:
  - P: No additional yield
    N: 400 kg x € 4.60 = €1840/ha/year)
  - increased Brix^{o} value is not paid for (N)
  - Ripening time not affected => no effect on selling price (P)

Effect of new production methods on economic viability

Ex-post: season extension using LED

- Estimations of additional costs:
  - LED lamps: about € 225/100 W or € 250/300 W LED (N)
    estimation: 1.5x3m=2,222/ha = €500,000/ha. 10 years, 6% = €65,000/ha/year
  - Electric system (not included)
  - Labour demand to hang up lamps (not included)
  - 45% reduction electricity costs compared to standard HPS (P), but about €3,200/ha/year (60 days, 4 hrs/day, € 0.06/kWh, €0.12 taxes not included)
  - 35% increased heating costs compared to standard HPS (P)

- price will reduce, long life span (10,000 hrs), less lamps, but factor 35 now
- Conclusion: economically not feasible for commercial fruit growers
  (at this moment)

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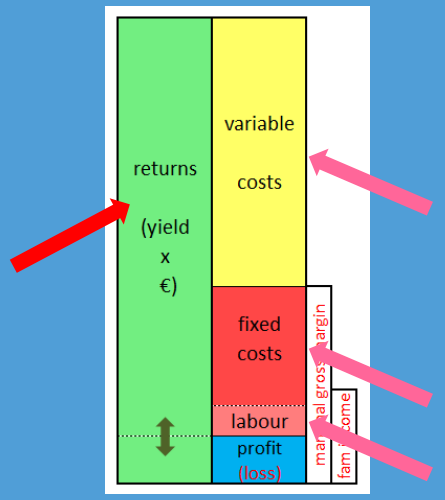
Effect of new production methods on economic viability

Ex-post: season extension (plastic cover, fiber cover, shoot mowing)

- studies in raspberries (Skierniewice, 2011-2013)

		ripening (days +/-)	yield (%)	mean weight
Polesie	control			
Polesie	plastic cover	-9.7	131%	108%
Polesie	fiber cover	-7.0	140%	105%
Polesie	shoot mowing	16.0	87%	101%
Polka	control			
Polka	plastic cover	-9.7	121%	105%
Polka	fiber cover	-9.7	126%	105%
Polka	shoot mowing	16.0	83%	102%
Polana	control			
Polana	plastic cover	-9.7	126%	109%
Polana	fiber cover	-7.0	134%	106%
Polana	shoot mowing	13.7	81%	106%



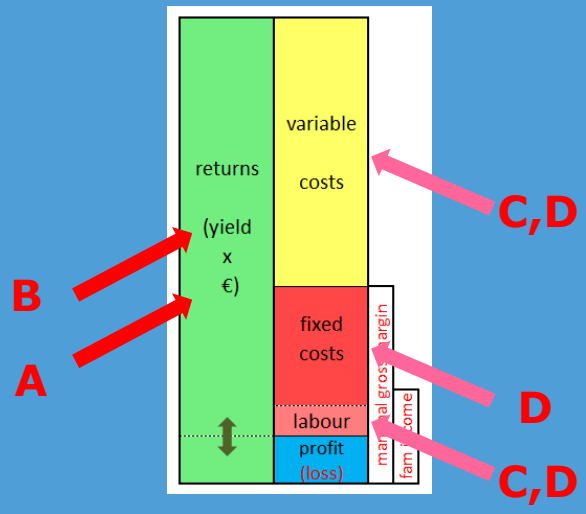
Effect of new production methods on economic viability

Ex-post: season extension (plastic cover, fiber cover, shoot mowing)

- Quality supposed to be not affected (Brix)

	ripening (days +/-)	yield (%)	mean weight
control			
plastic cover	-9.7	126%	107%
fiber cover	-7.9	134%	105%
shoot mowing	15.2	84%	103%

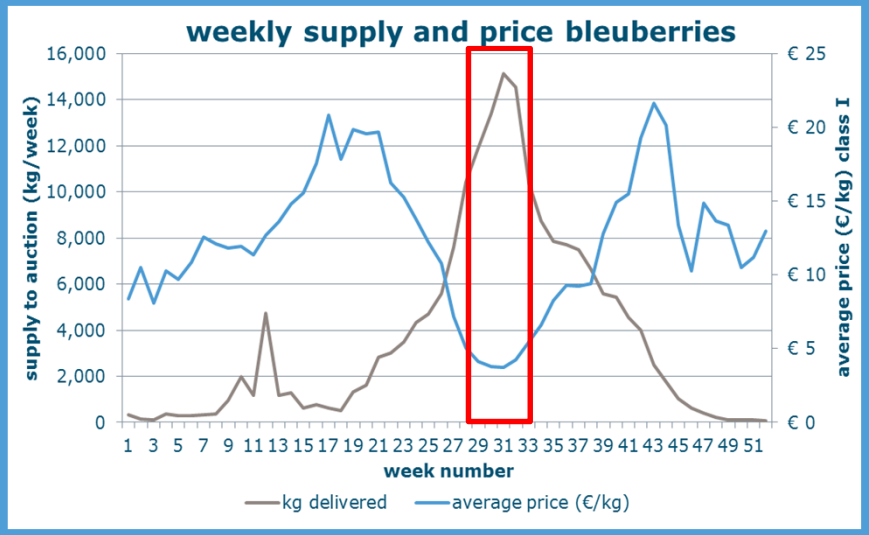
D A B C



Effect of new production methods on economic viability

A: effect on ripening time of the strawberries

Price and total production of blueberries in NL



Effect of season extension for strawberries (2012)

Returns may increase about €1000/ha

	ripening (days +/-)
control	
plastic cover	-9.7
fiber cover	-7.9
shoot mowing	15.2

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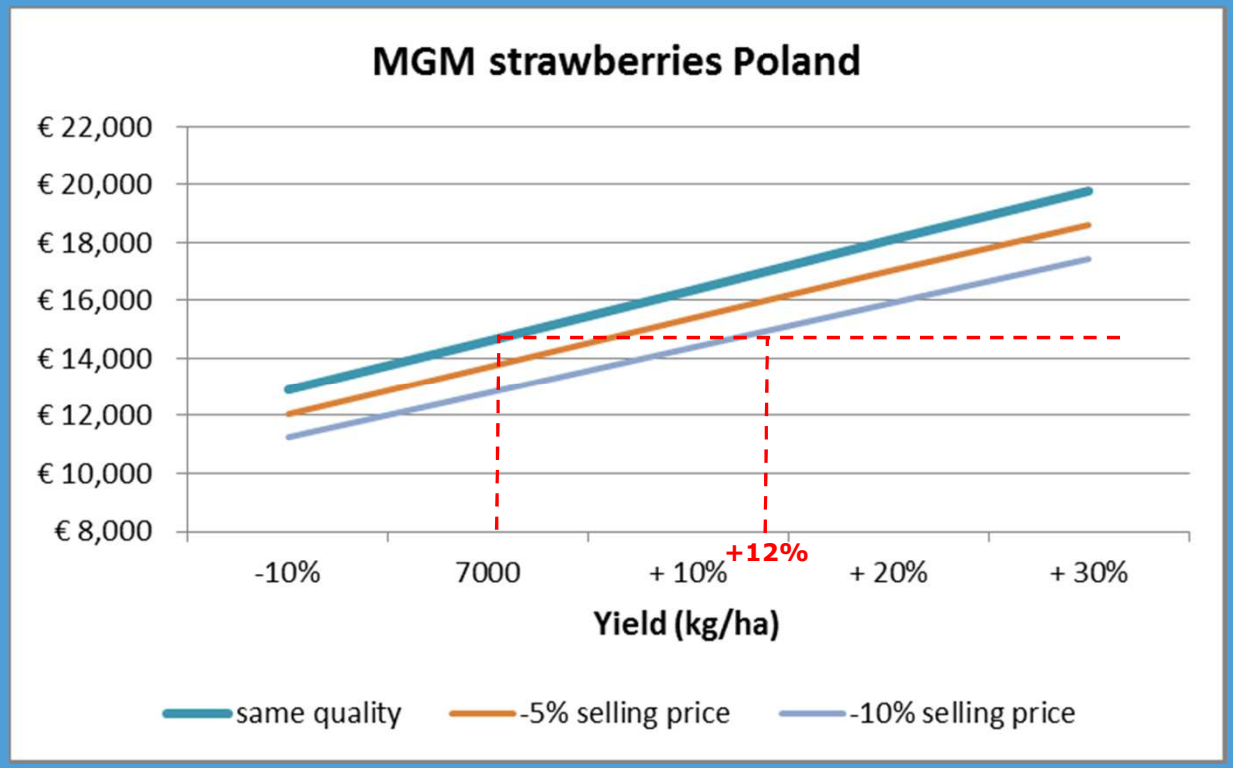
Effect of new production methods on economic viability

B: effect on yield (7000 kg/ha is normal)



	ripening (days +/-)	yield (%)
control		
plastic cover	-9.7	126%
fiber cover	-7.9	134%
shoot mowing	15.2	84%

- Quality is essential!
- Returns may increase up to €5000/ha

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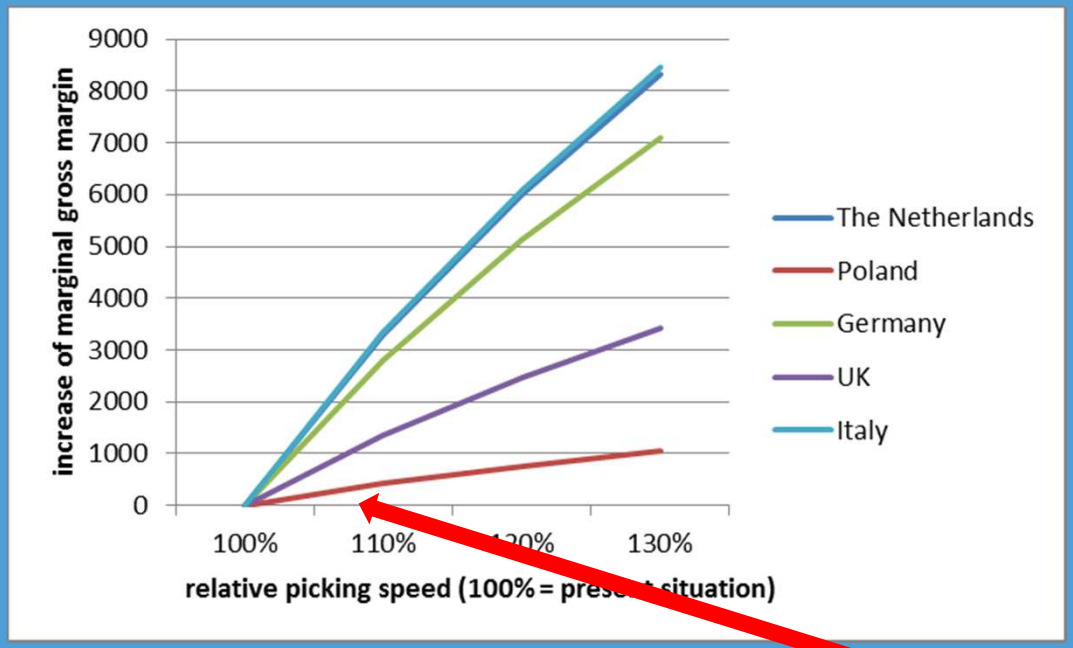
Effect of new production methods on economic viability

C: effect on picking speed

- (projected on raspberrie)



variable costs may decrease € 300/ha

	mean weight
control	
plastic cover	107%
fiber cover	105%
shoot mowing	103%

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Effect of new production methods on economic viability

D: effects on direct costs & fixed costs and on farmers income

- Higher yields, higher prices, reduced picking costs 
- Additional costs for tunnels, films, energy 
  - Tunnels: depreciation, interest, maintenance (fixed)
  - Energy: variable cost

Effect of new production methods on economic viability

Economic viability depends on local situation

- Compare additional returns with additional costs
- Netherlands:
  - annual costs tunnel: € 7,600/ha (NL), € 5,500/ha (PL) => system seems economically profitable in Poland
  - annual costs greenhouse € 12,800 (NL) => probably to expensive
- Variable costs heating (temperature in-/outside, price)

Effect of new production methods on economic viability

mayor effects on yield and production costs:

	durability	Average yield	Labour harvest	Labour tariff	Annual costs tunnel	Energy costs
open production	20 years	8.5 t/ha	2250 hr/ha	€5/hr	-	-
production in tunnel	6 years	7.0 t/ha	1500 hr/ha	€ 14/hr	€ 7,600	€25,000/ha

- Effect on cost price:
  - Open culture € 4.18/kg
  - Tunnels: € 11.52/kg
    - 10% lower energy costs: € 11.18/kg
    - One more year (7 years): € 11.00/kg
    - 10% higher yield: : € 10.71/kg
  - This is why data / estimations should be as accurate as possible, based on local and individual farmers situation

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Conclusions

- Cost price is allowed to increase (a little) if selling price increases
- Quality (price) has mayor effect on Marginal gross margin and on the income of fruit grower
- Reduction of variable costs (water, fertilizer) generally has a minor effect on Marginal gross margin and income fruit grower (exception: hired labour)
- For advice at farm level, (estimations of expected) individual effects on costs, yield and prices are needed

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