Economic viability of new production methods

EUBerry WP2 meeting

Sept. 25th 2013, Stjørdal, Norway

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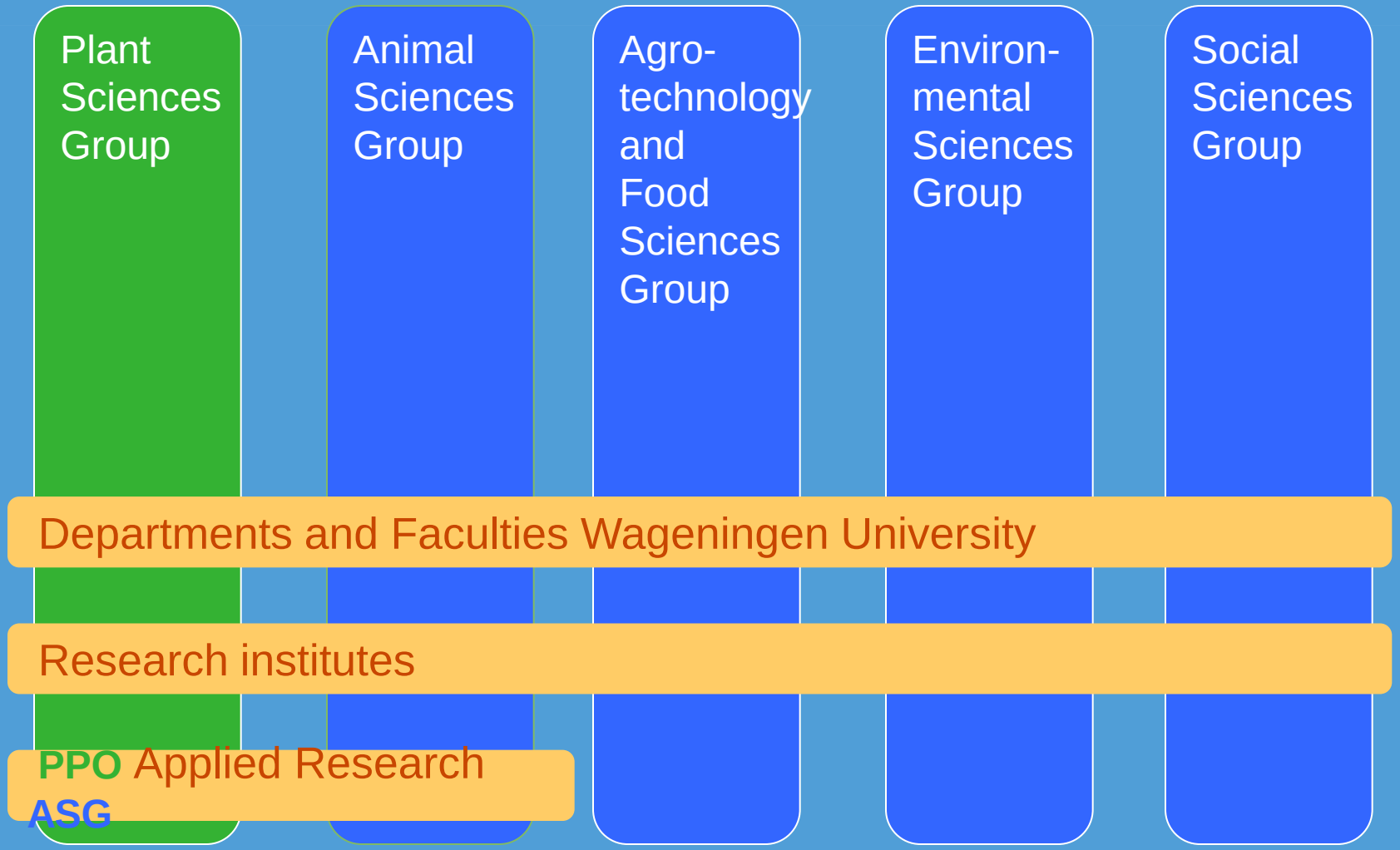
SEVENTH FRAMEWORK PROGRAMME

EUBerry

LEI and PPO within Wageningen UR



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Outline

- Why calculations 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
  - Effects of innovative production methods on economic viability
  - Effects of season extension
- Ex-ante and ex-post economic evaluation
  - Which data are needed?
- General conclusions

Why calculations of economic viability?

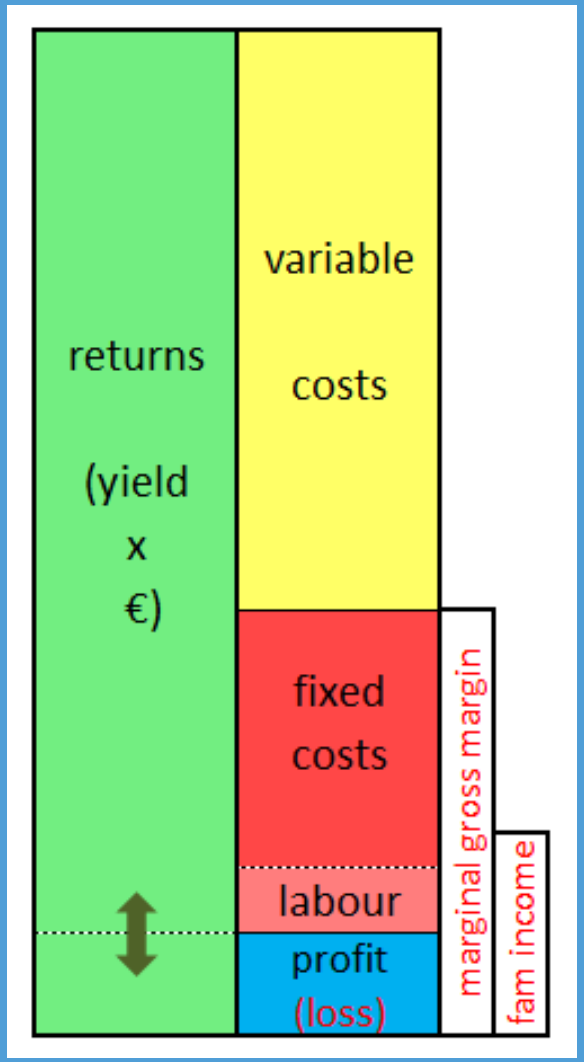
- Economic profitability is a condition for implementation of sustainable culture systems by the European fruit producers.

  And therefore:

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

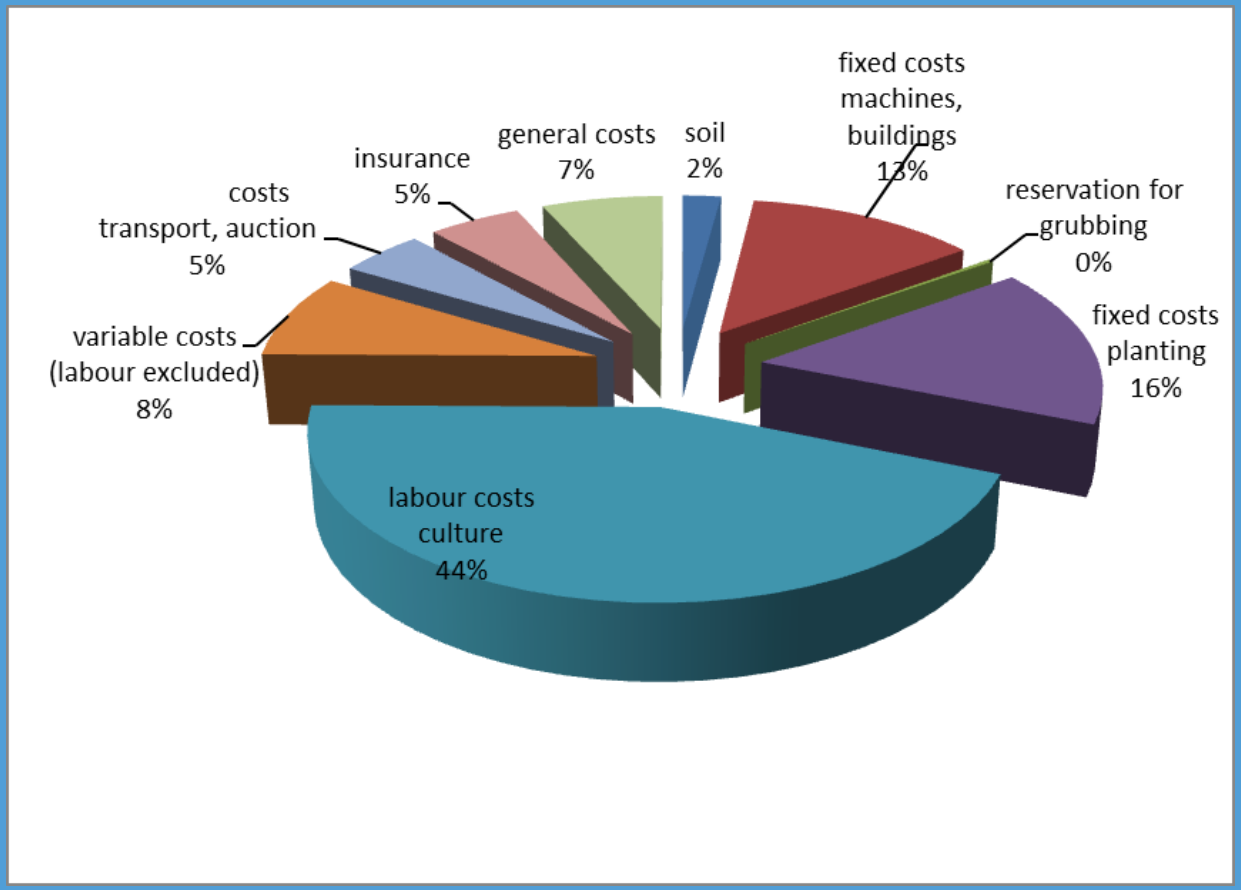
Cost price and growers income

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



Cost price of blueberries in The Netherlands

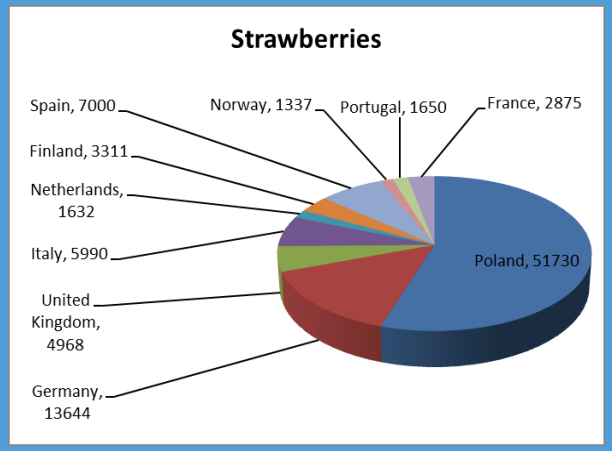
- Mayor costs are for labour and fixed costs for planting and for machines & buildings (and for variable costs)

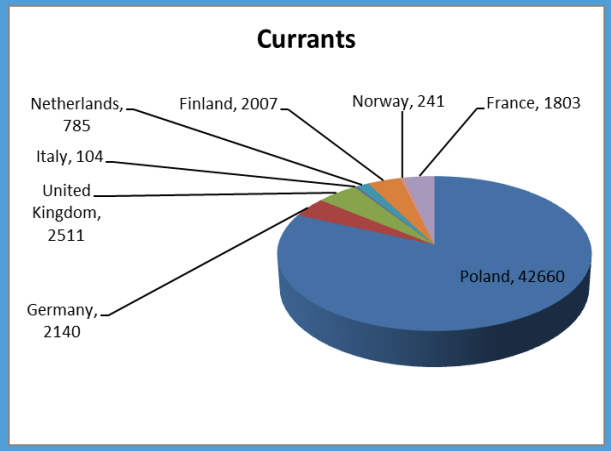


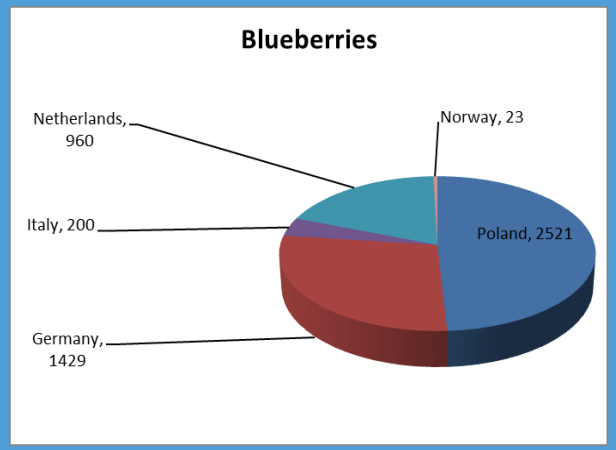
EUBerry: Economic viability of new production methods; Selection of countries

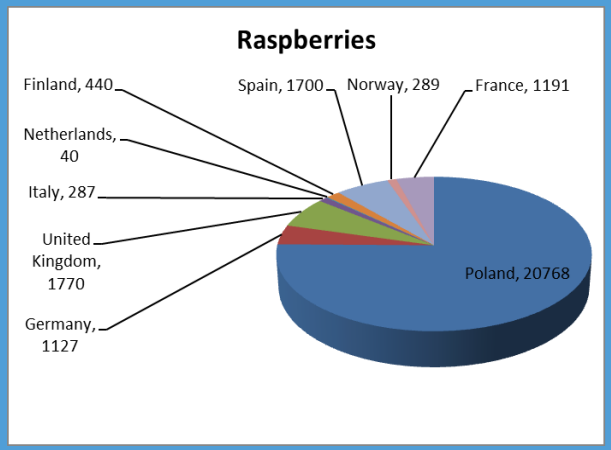
Criteria:

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









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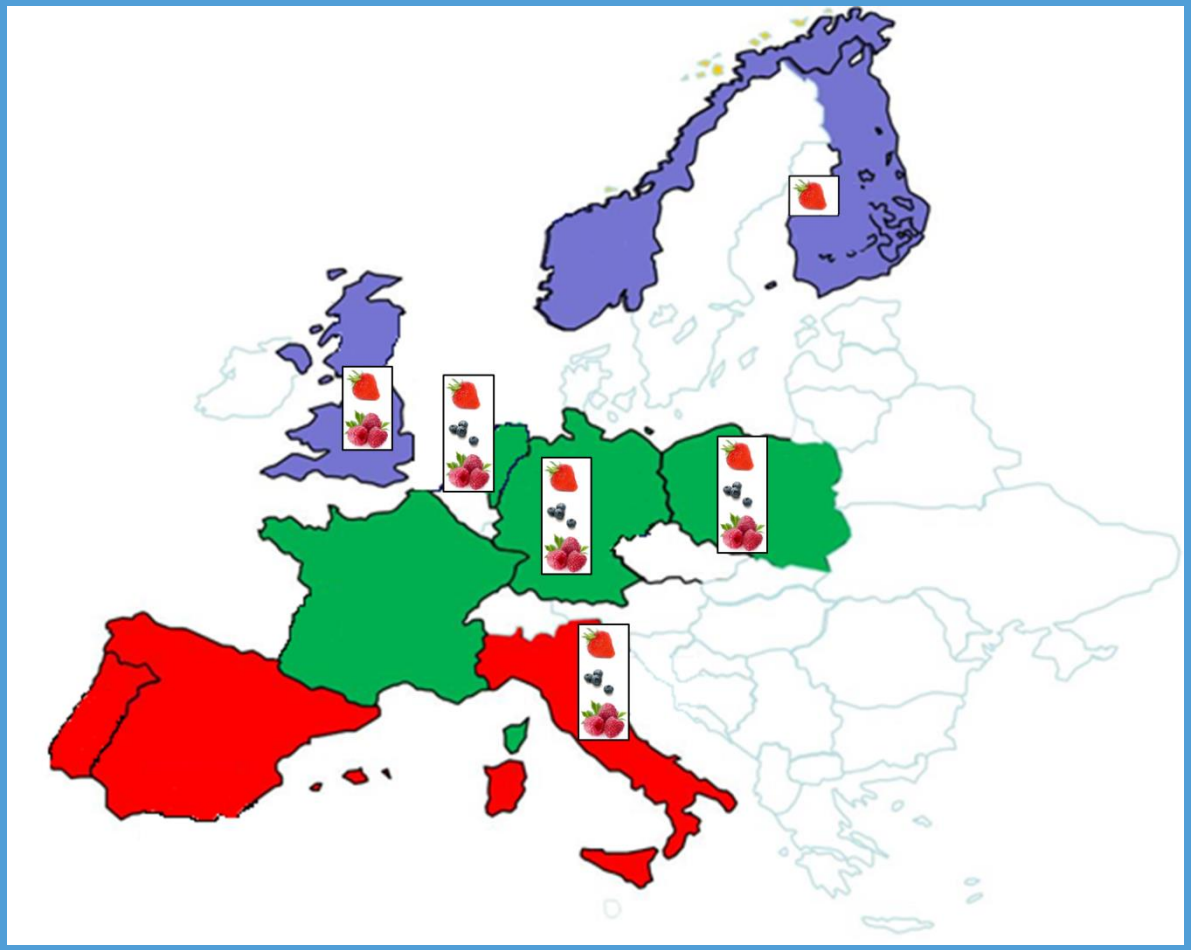
EUBerry: Economic viability of new production methods; Overview of countries were data were selected



In the ex-post economic evaluation Norway and Spain will be included, since data will be available.

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 (LED, mites, micro-org.) (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)

EUBerry: Economic viability of new production methods

Calculation of Marginal gross margin:

Marginal gross margin Bleuberry

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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EUBerry: Economic viability of new production methods

Calculation of Marginal gross margin

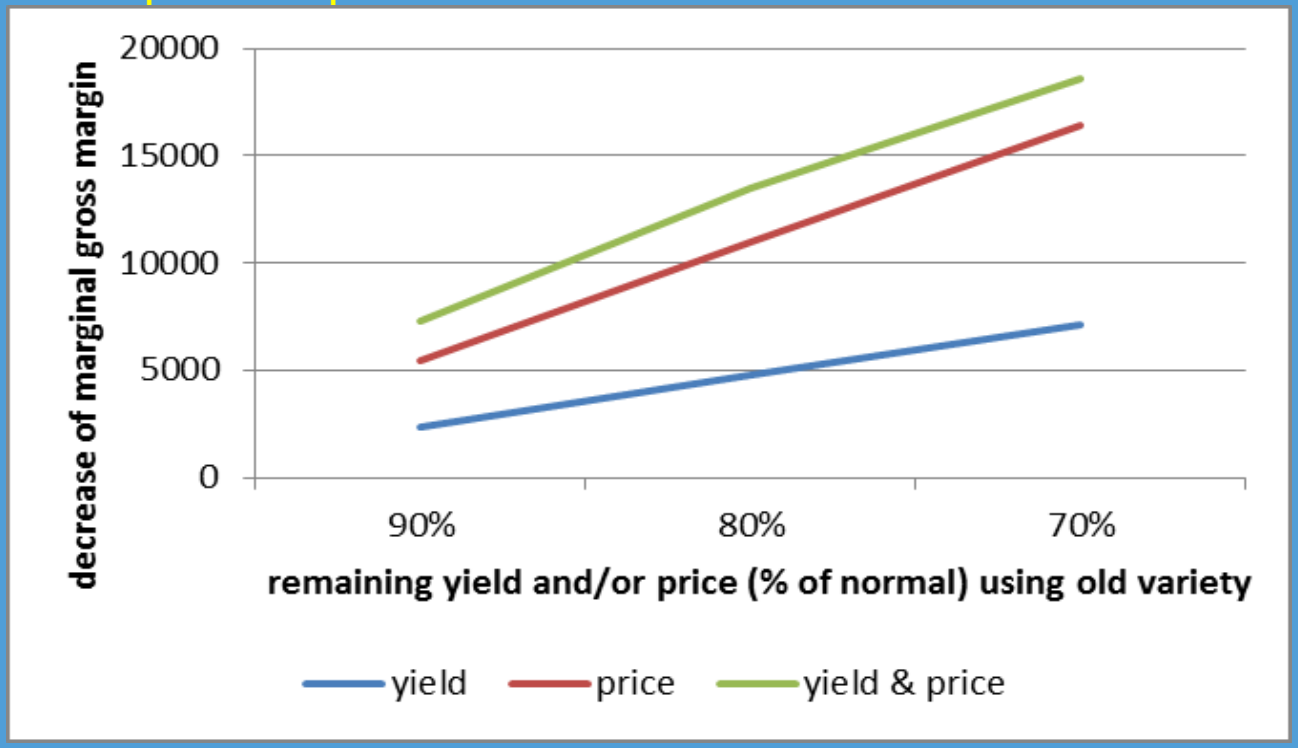
example: Blueberry in The Netherlands

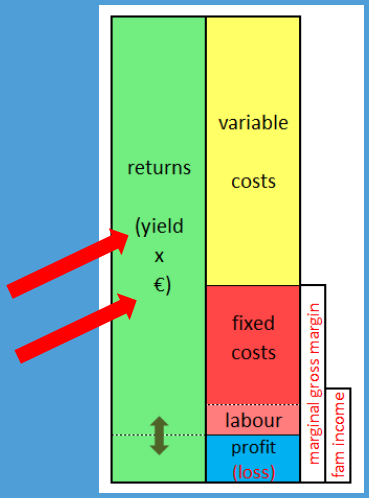
Yield -/- losses (kg per ha)	7.650		
Returns (€/ha)		**€**	**24.863**
Fertilizers	... ...		
Fuel, *et cetera*	... ...		
Interest on working capital	... ...		
variable costs		€	9.328
Gross margin (€ per ha)		**€**	**15.535**
Temporary labour	... ...		
Transportation, *et cetera*	... ...		
marginal costs		€	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**

Effect of new production methods on economic viability

New raspberry varieties with reduced water requirement

- Economic effect depends on reduction of price and/or quality with the current production system, due to shortage of water.
- Example: raspberries in UK

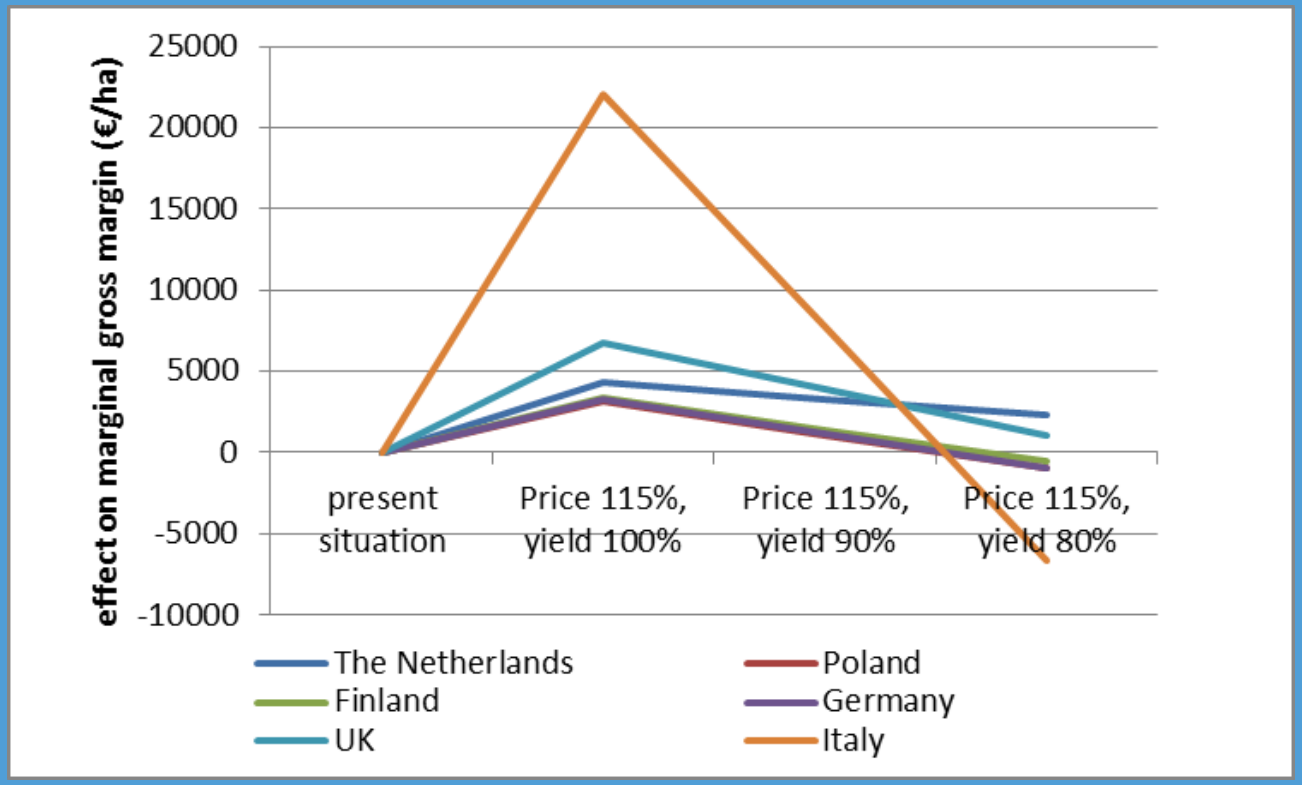


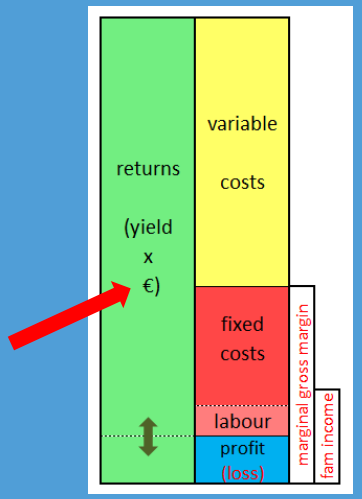


Effect of new production methods on economic viability

Low residue level (bio-control, DSS) in strawberries

Economic effect depends on quality (price) and yield

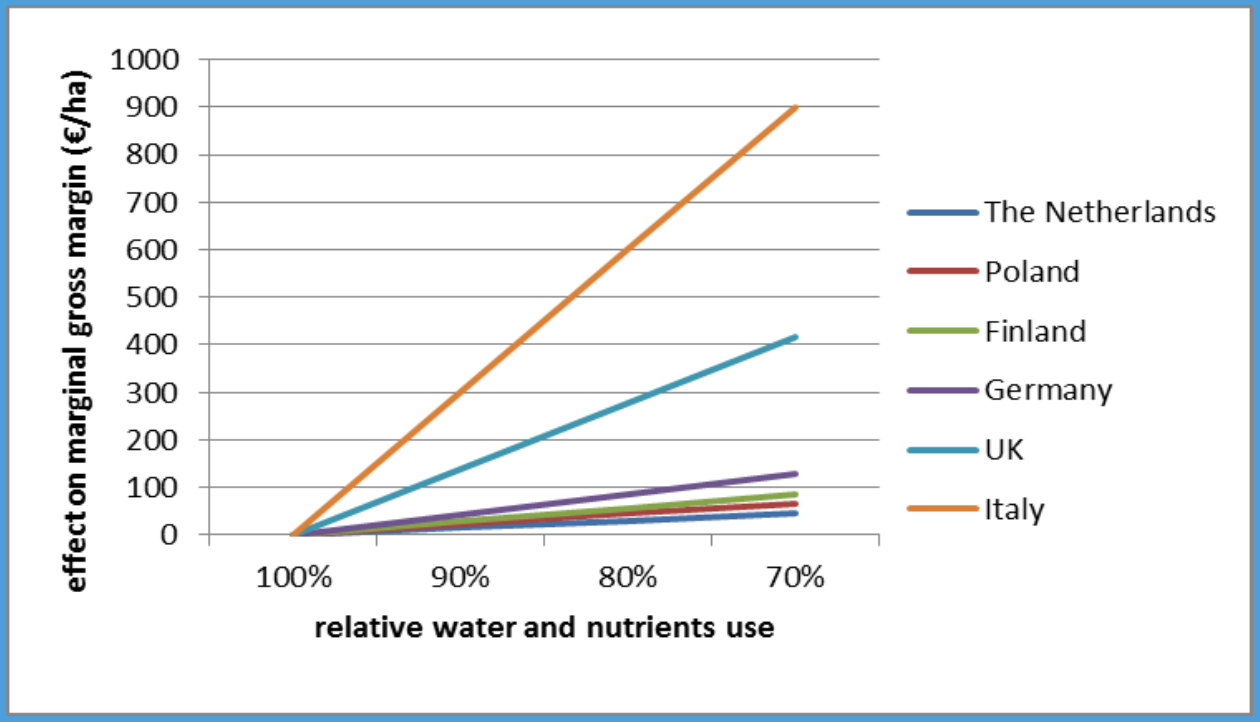


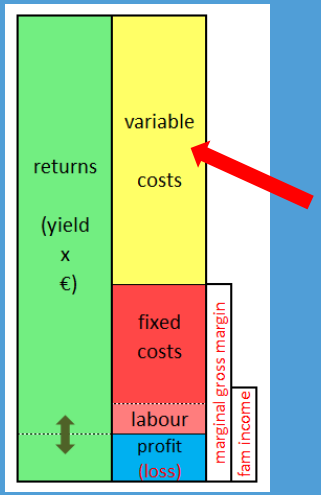


Effect of new production methods on economic viability

Reduced water and nutrients use

- E.g. in strawberries, but the same in raspberries and blueberries
- Condition: yield and quality not affected!
- Additional fixed costs must be very low

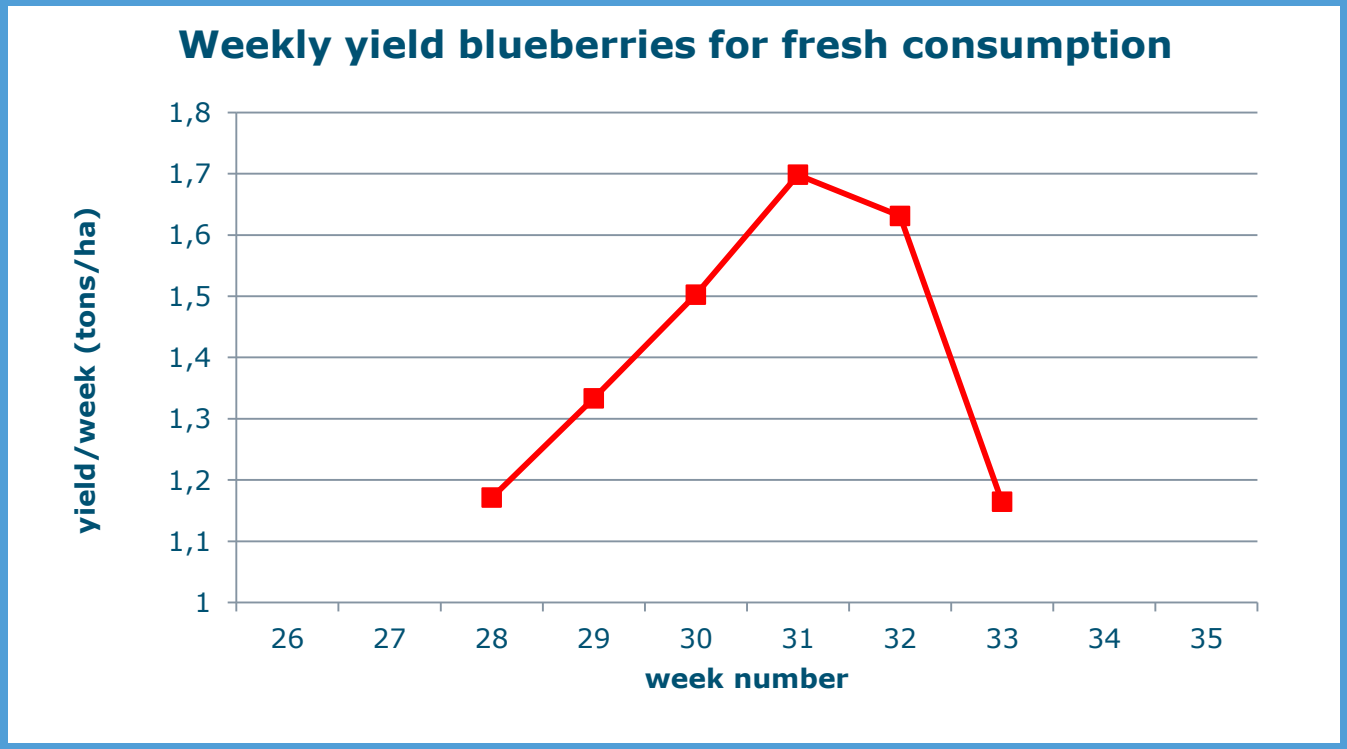


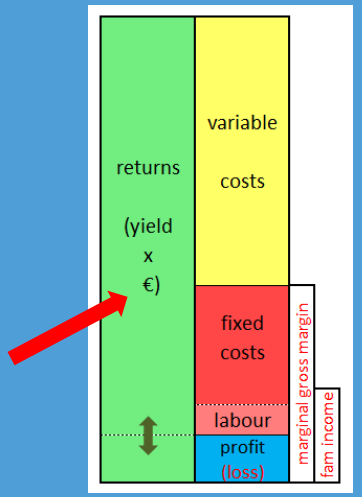


Effect of new production methods on economic viability

Short time effects of season extension

- Production of open culture Blueberries in NL
- Total yield about 8.5 tons/ha (average year 1-20)

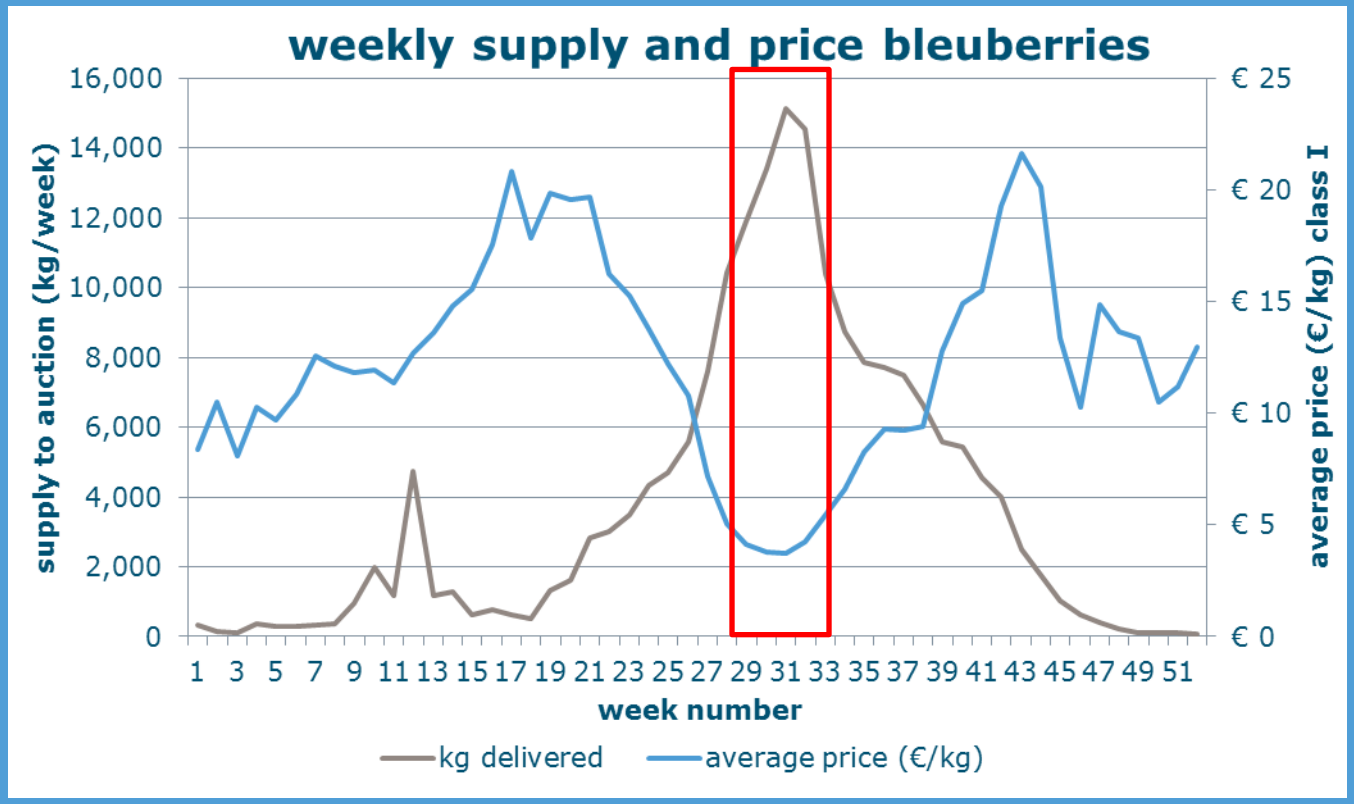




Effect of new production methods on economic viability

Short time effects of season extension

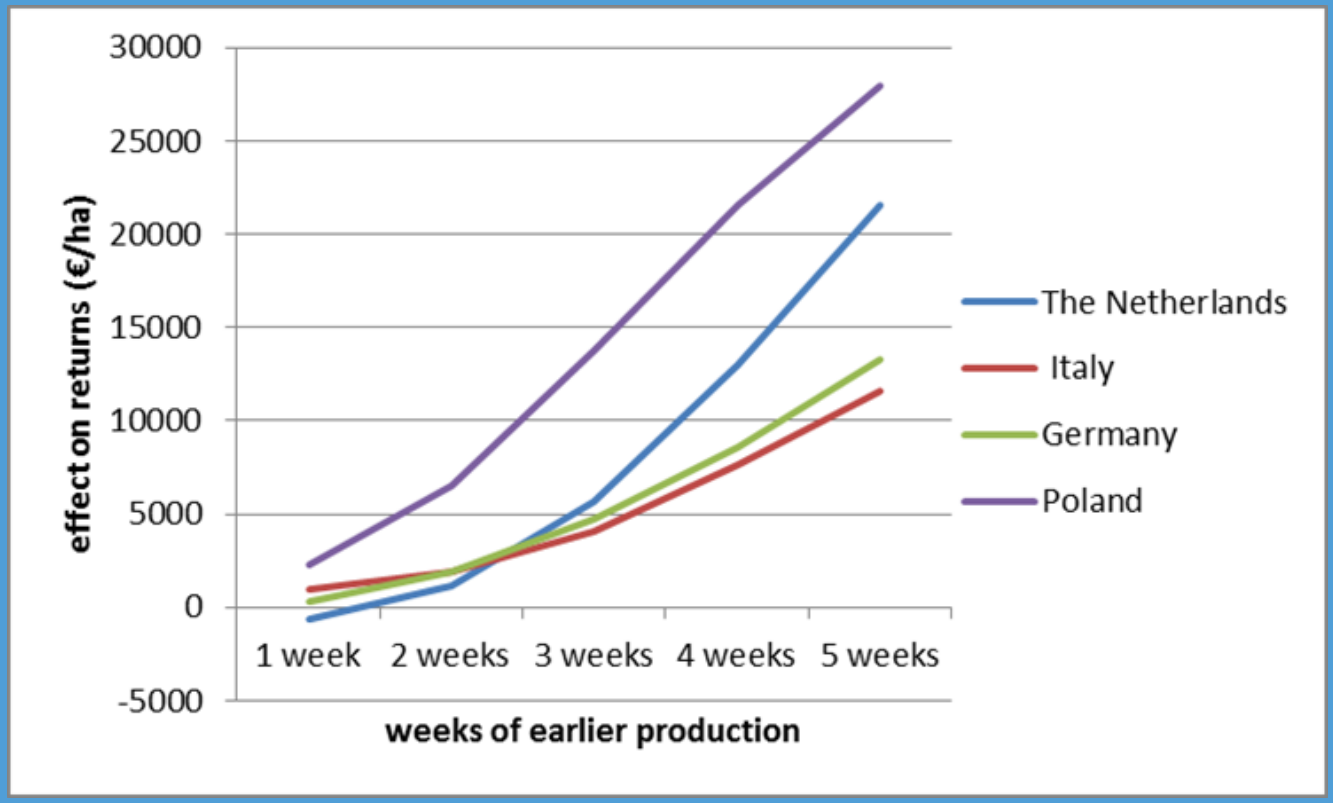
- Price and total production of blueberries in NL
- Not only open culture and fresh, total supply to auction



Effect of new production methods on economic viability

Short time effects of season extension

- Price effect of earlier production of blueberries (comparable effects in straw- and raspberries and in other countries)
- Economic effect affected by yield&price differences between countries



Effect of new production methods on economic viability

Benefits define maximum acceptable costs

weeks of earlier production	gross benefit /ha
0	
1	€ 2,117
2	€ 8,529
3	€ 11,883
4	€ 14,631
5	€ 16,665

annual costs tunnel: € 7,600 => two weeks earlier needed (excl. heating costs and effect on yield)
annual costs foil greenhouse: € 12,800=> four weeks earlier needed (excl. heating costs and effect on yield)

Effect of new production methods on economic viability

Short time benefits indicate maximum acceptable costs

		open production		production in tunnel	
weeks earlier	average price	cost price	net result/ha	cost price	net result/ha
0	€ 4.32	€ 4.18	€ 1,150		
1	€ 4.56			€ 11.52	€ -48,500
2	€ 5.57			€ 11.52	€ -41,500
3	€ 6.97			€ 11.52	€ -32,000
4	€ 8.69			€ 11.52	€ -20,000
5	€ 10.65			€ 11.52	€ -6,000
6	€ 12.56			€ 11.52	€ 7,300
7	€ 14.54			€ 11.52	€ 21,100

Tunnel profitable if production advances ≥ 6 weeks:

Effect of new production methods on economic viability

However, 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

Long term effects of season extension

- Hard to define, since many interactions:
  - Effect on international trade
  - Behaviour of consumers
    - do they want to buy & eat it?
    - do they prefer homegrown products?
  - Price effect when off-season production increases?

- Topic will be studied within WP4 in 2014
  - Effects on cost price are needed now already, effects on returns not known yet

Data needed for ex-post econ. evaluation

- Ex-ante evaluation focussed on yield or price that is needed, ex-post evaluation on economic feasibility
- Economic data for current production systems (including price development within season) are needed and will be collected via WP-leaders.
- Questions to researchers, per technique to be evaluated:
  - Effect of new technique on yield and or price?
  - Effect on labour demand?
  - Effect on fixed costs of planting (e.g. plants/trees)?
  - Effect on fixed costs for machines/buildings?
  - Effect on material use (e.g. manure, crop protection, energy, bees, etc)?
  - Are these data confidential or may they become published?

Conclusions

- Cost price may increase if selling price increases
- Quality (price) has mayor effect on Marginal gross margin and on the income of fruit grower
- Cost reduction (water, fertilizer) generally has a minor effect on Marginal gross margin and income fruit grower
- For ex-post economic evaluation, (estimations of expected) effects on costs, yield and prices are needed

Special thanks to:

Rex Brennan (UK), Anu Koivisto (FI), Sara Bellini (IT), Gianluca Savini (IT), Derek Stewart (UK), Eike Kaim (DE), Paivi Parikka (FI) and Krzysztof Zmarlicki (PL)