

Optimizing and retaining product quality in the supply chain:

for whom and who profits?

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What is product quality?

- The consumer determines
- The retail has the power
- The supply chain tries to cope



What are the consequences for innovation

- Vertical dependence in the chain
- Investment here = Profit there
- Innovation=> strategic cooperation



Chain integration $\Rightarrow$ Research strategy

Quality management & Consumer science

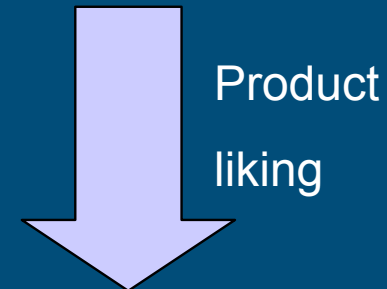
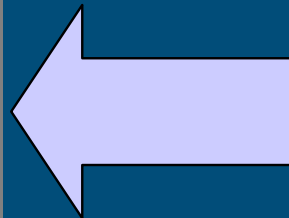
- Post-harvest product handling & logistics (ripening)
- Biological variation in physico-chemical product properties
- Sensory perception and evaluation (Liking)



Chain science:

- Collaborative marketing
- Cost sharing
- Pricing
- Profit distribution

Demand

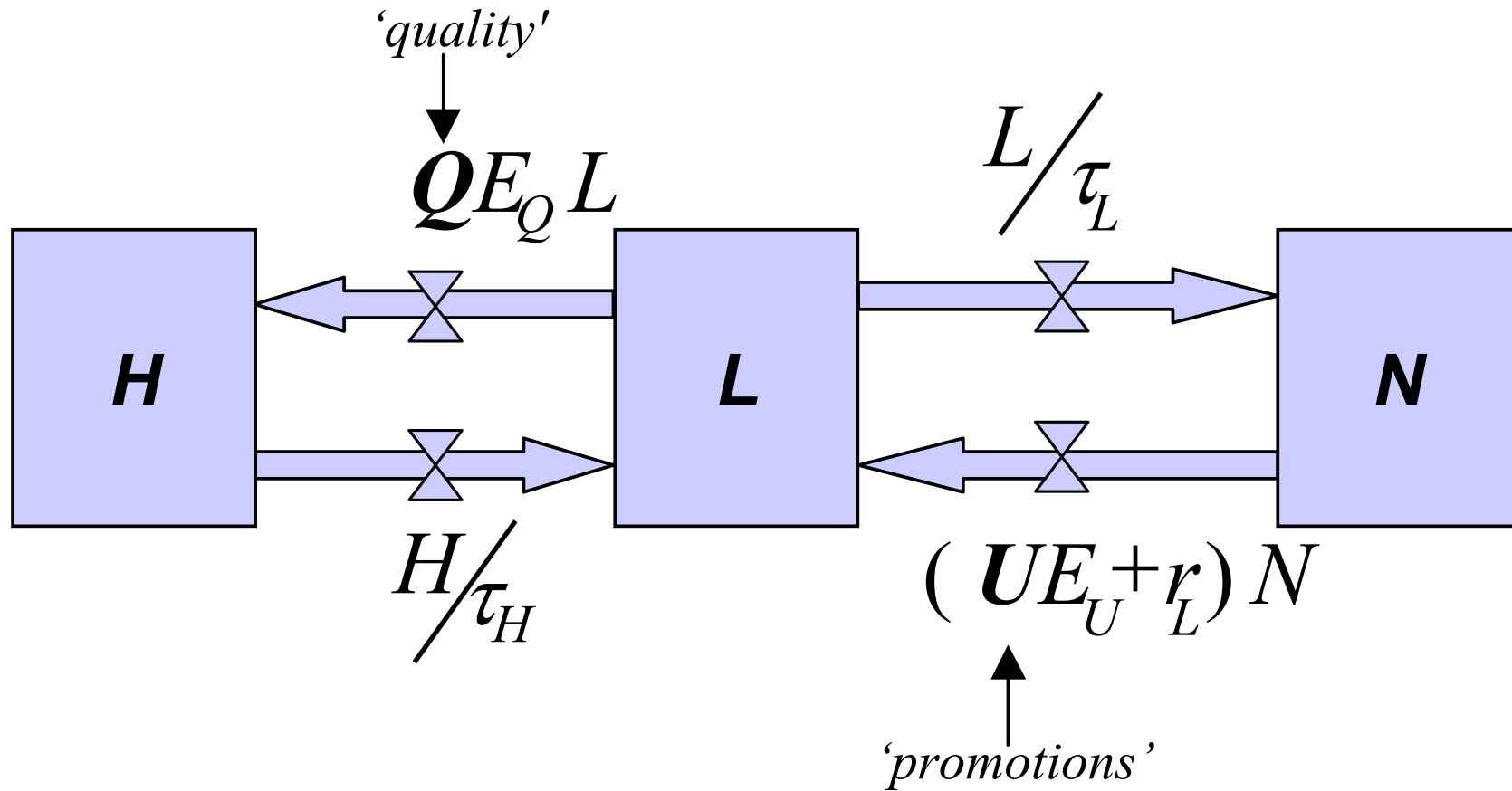


Consumer science:

- Adoption dynamics
- First and repeat usage
- Loss of interest dynamics



The consumer model



Model description through ODE's

$$N(t) = Z - L(t) - H(t)$$

$$\frac{dL}{dt} = -(QE_Q L - H/\tau_H) + (UE_U + r_L)N - L/\tau_L$$

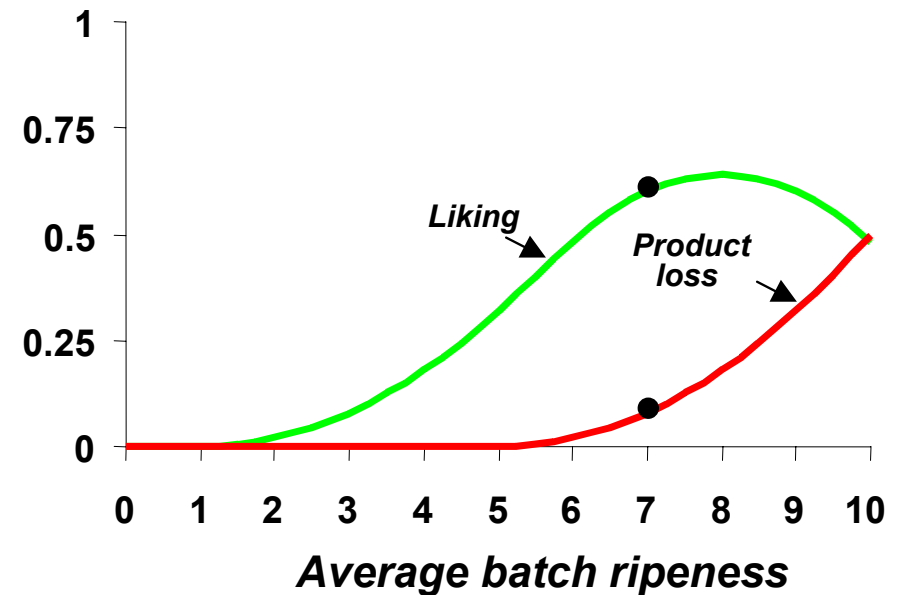
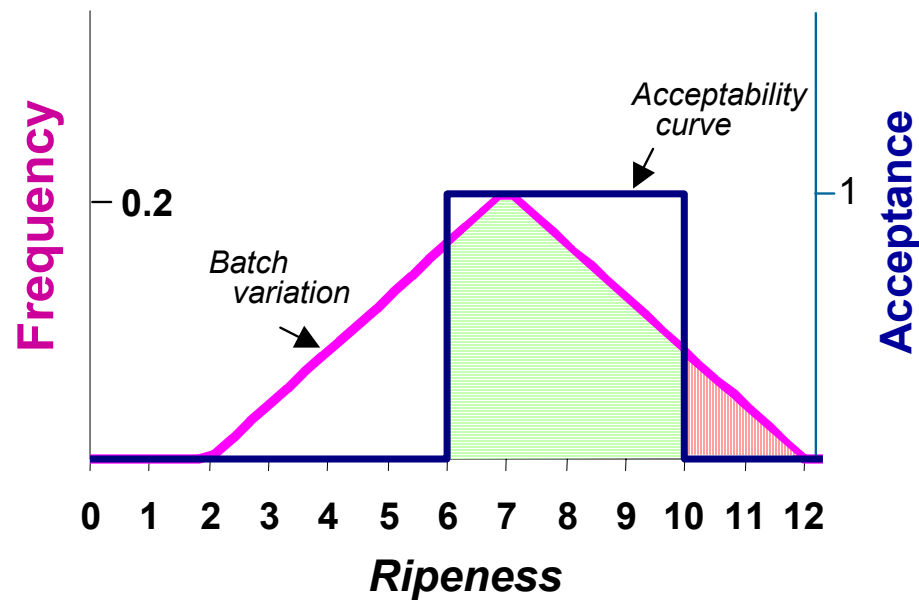
$$\frac{dH}{dt} = QE_Q L - H/\tau_H$$

The solution in steady state

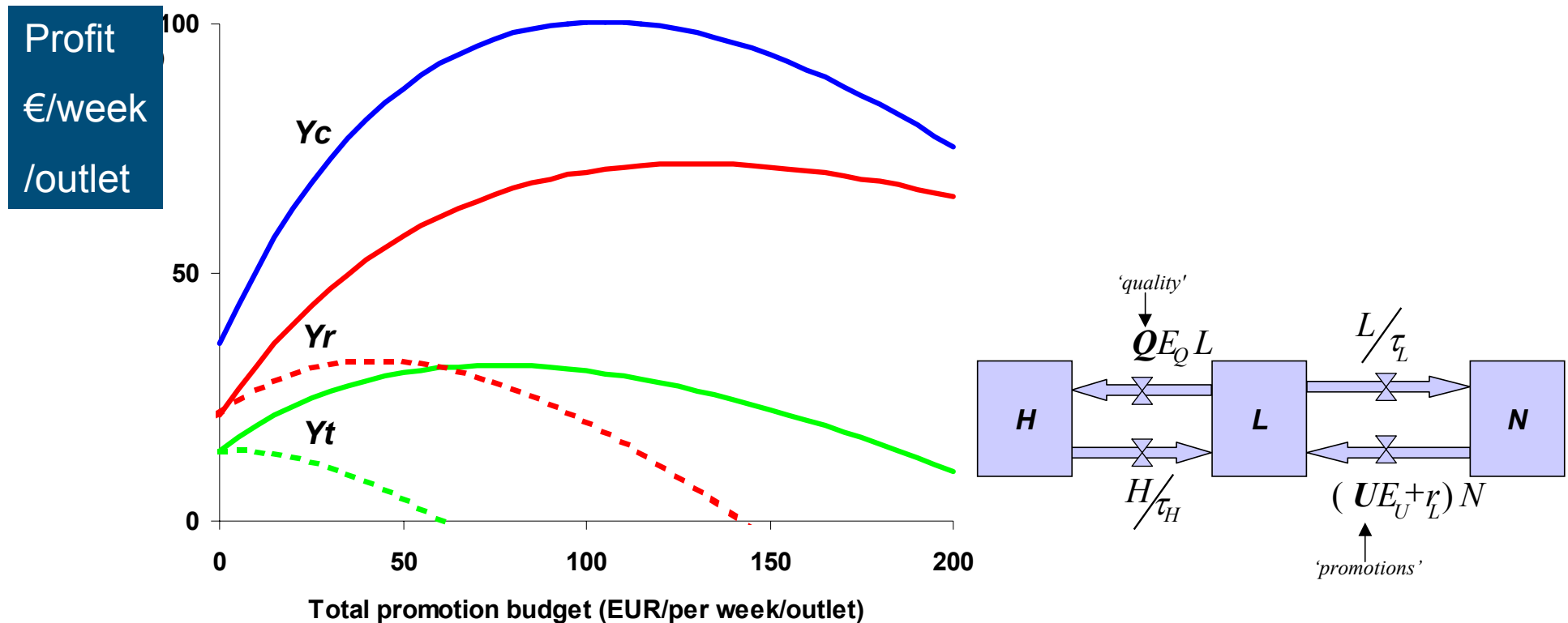
$$\frac{L}{Z} = \frac{1}{1 + \left[(r_L + UE_U) \tau_L \right]^{-1} + QE_Q \tau_H}$$



Ripeness, Liking and Product Loss

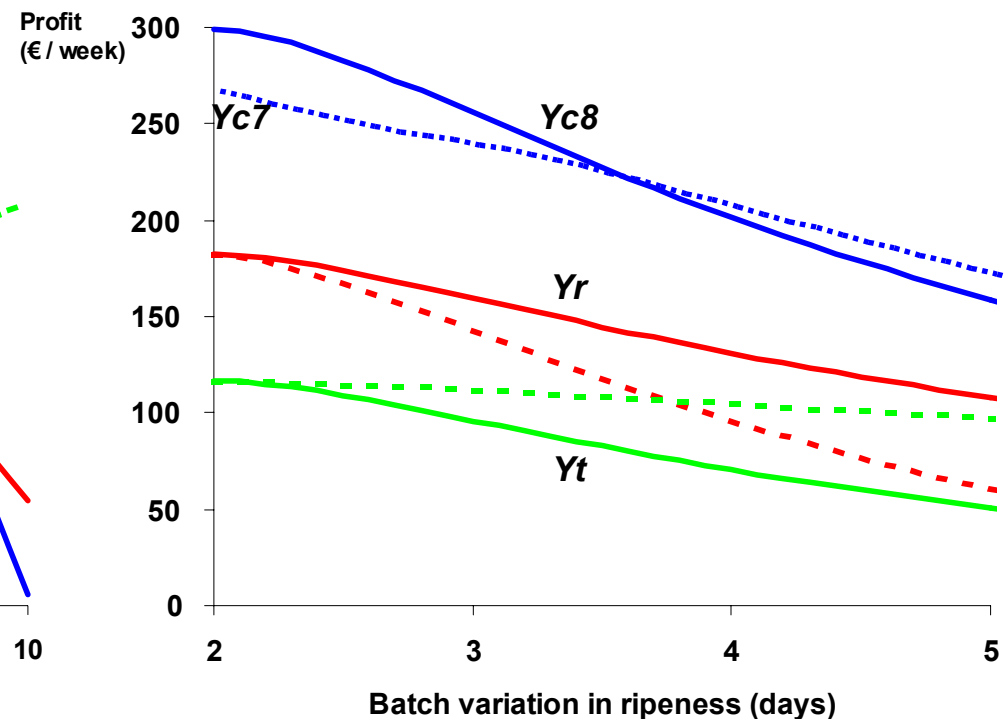
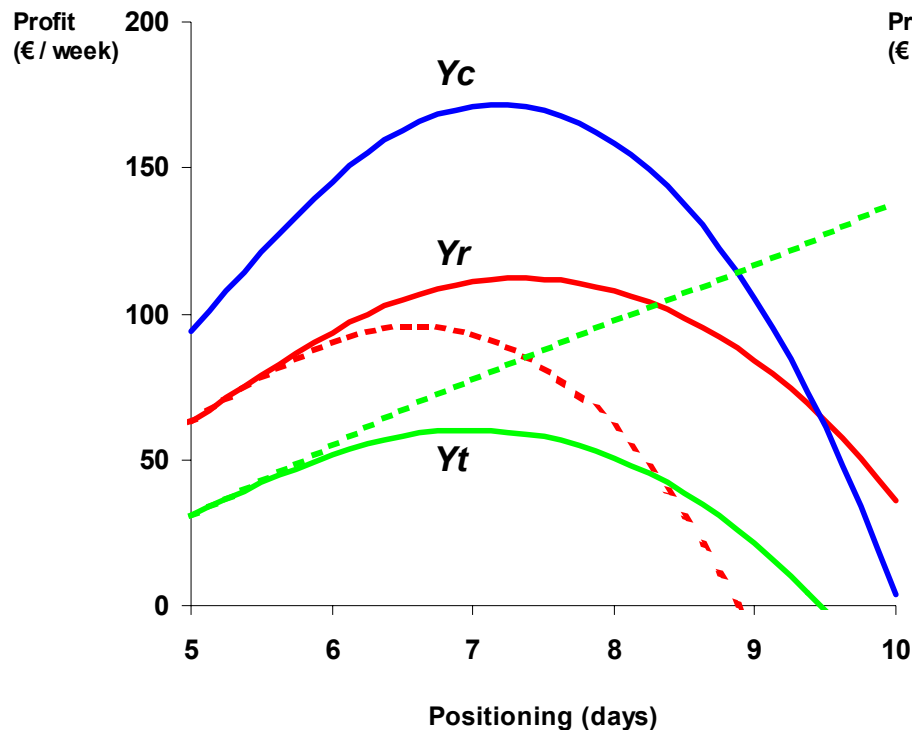


Who earns what, during a promotion?



Profits per chain player as function of the total promotion budget. Dashed lines indicate the profits – after the promotion cost – when the retailer or trader pay 100% of the promotion budget. Solid lines correspond to the profits when 50/50% cost sharing of the promotion budget between retailer and trader is negotiated

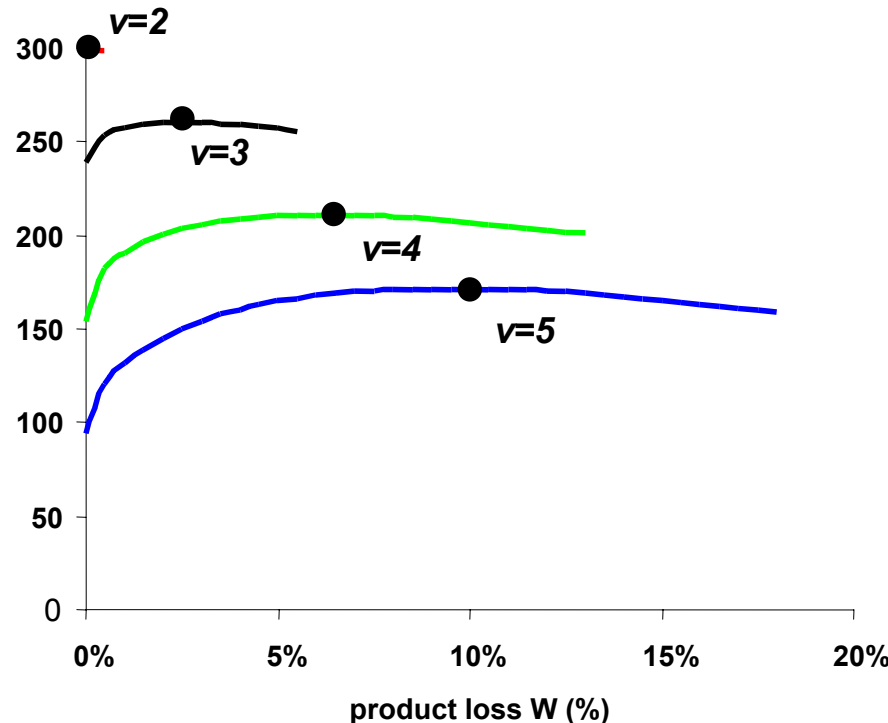
Who earns what, when waste occurs?



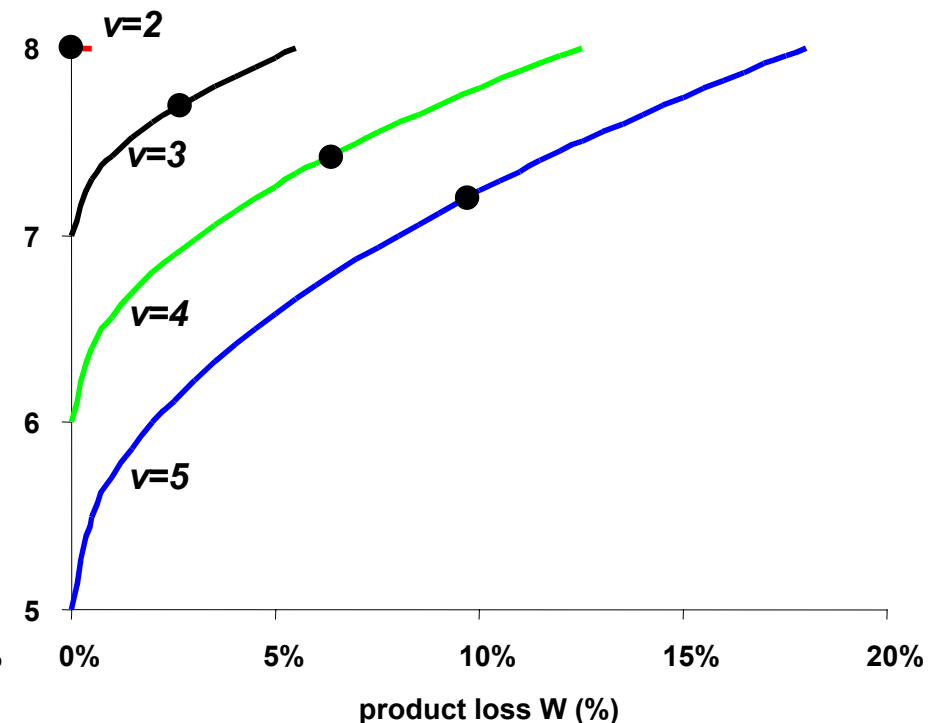
Profits per chain player as function of the average ripeness (left) and variation in ripeness (right). Dashed curves indicate $fw = 1$, solid curves $fw = 0$. Left panel is with variation $v=5$ days, the right panel is with average ripeness $T=8$ days (except for dotted line indicated Y_{c7} , which corresponds to $T=7$)

The effect of batch variation on profit?

Chain profit
 Y_c (€/week)



Positioning
T (days)



Chain profit (Y_c in fig. 5) as a function of product loss (W) given in percentage is shown to have an optimum (●), dependent on the level of variation (v) of the quality attribute in the batches in the left pane



Conclusion

- The more variation in batch quality, the more profit can be reaped from vertical cooperation!



Thanks for your attention.

Questions?

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