

# New possibilities for farming the European lobster

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Aquaculture Europe 2002 - "Seafarming Today and Tomorrow"

16 - 19 October 2002. Trieste, Italy



## Why should we farm lobsters?



- High and increasing value (>30 Euro/kg)
- Estimated production costs around 22 Euro/kg
- International market appeal
- Well understood life cycle
- More than 100 years experience with larval rearing
- Many centuries experience with live holding and trade with live lobsters
- Large research base on European (*Homarus gammarus*) and American lobsters (*H. americanus*) biology
- More developed aquaculture technology



# Historical background

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- The hatchery movement 1880-1954
  - Release of millions I-stage and IV-stage lobster
  - Several hatcheries in USA, Canada, GB, France, Norway
  - No tagging – no results
- The lobster aquaculture program in USA and Canada 1970's
  - Rearing technology
  - Brood stock - closed cycle
  - Lobster feed experiments
- The sea ranching projects UK & Norway 1980-95
  - Mass production technology for X-XII-stage juveniles
  - Release of tagged large juveniles (magnetic wire tags)

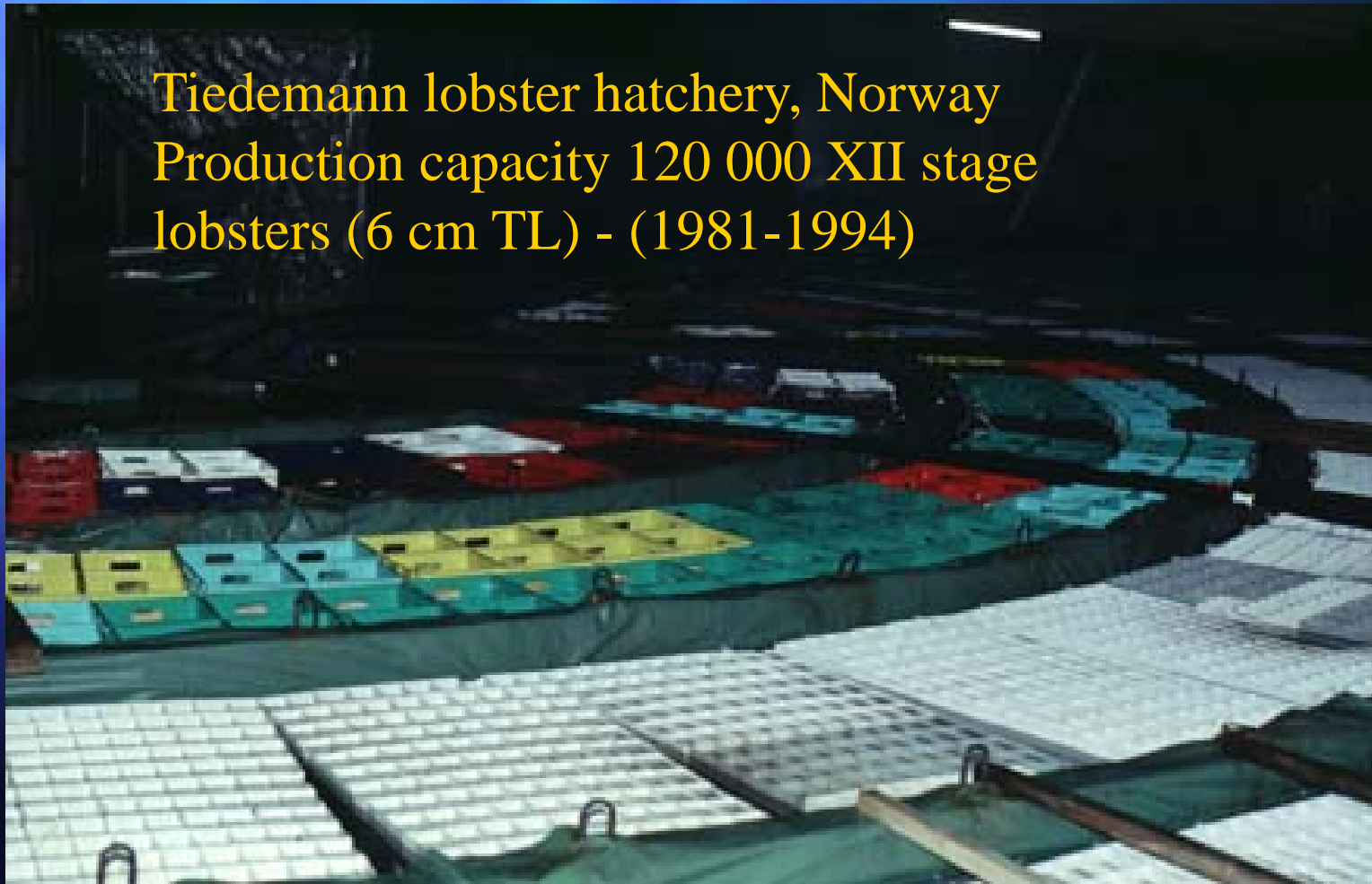
*Nicosia & Lavalli (1999) Marine Fisheries Review 61(2):1-57*





# Historical background

Tiedemann lobster hatchery, Norway  
Production capacity 120 000 XII stage  
lobsters (6 cm TL) - (1981-1994)



# Production methods

- Wild brood stock – fertilized eggs
- Females carries eggs for 11 months until hatching
- 2 weeks pelagic stage in larval tanks (Stage I-IV), fed live *Artemia* or frozen crustaceans
- Instar IV-XII - on-growing separately or communally (TL 5 cm)
- Released into sea (IV-XII) or on-growing in separate containers in 18-22°C water
- Harvest
  - Sea-ranching: 3-10 years (>500g)
  - Battery culture: > 2 years (>250g)

*Wickins & Lee (2002) Crustacean Farming*





Video: Eva Farestveit



# Stock enhancement and sea ranching

The Kvitsøy project (1991-2001):

- ❖ 125 000 tagged lobsters released
- ❖ >8000 (2-15%) recaptured
- ❖ 50-60% of the catches at Kvitsøy
- ❖ Same growth rates and size at maturity as wild lobsters
- ❖ No migration from Kvitsøy
- ❖ Still recaptures 10 years after release

From 2003 a new law will give property rights for lobsters caught within licensed areas



The Norwegian lobster farming and sea ranching organisation established 2002



# Intensive farming

## The Plate-sized lobster project (2001- )

Goal: Produce plate sized 250g lobsters two years from hatching

### Research topics:

Substrate and shelter demands

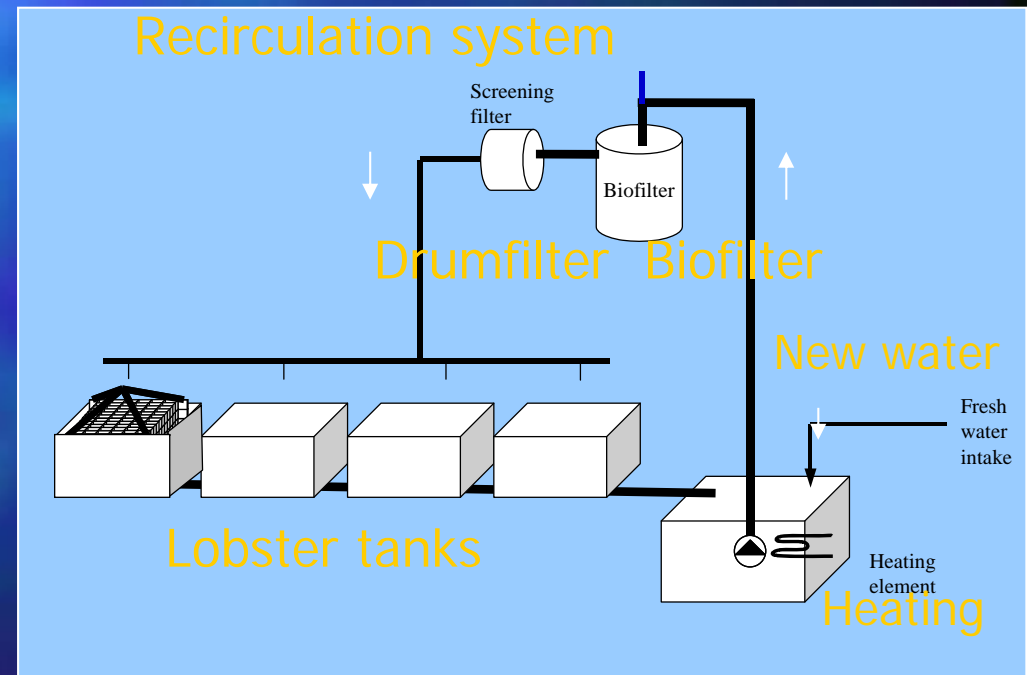
Evaluation of food types

Family variation

Recirculation and water quality management

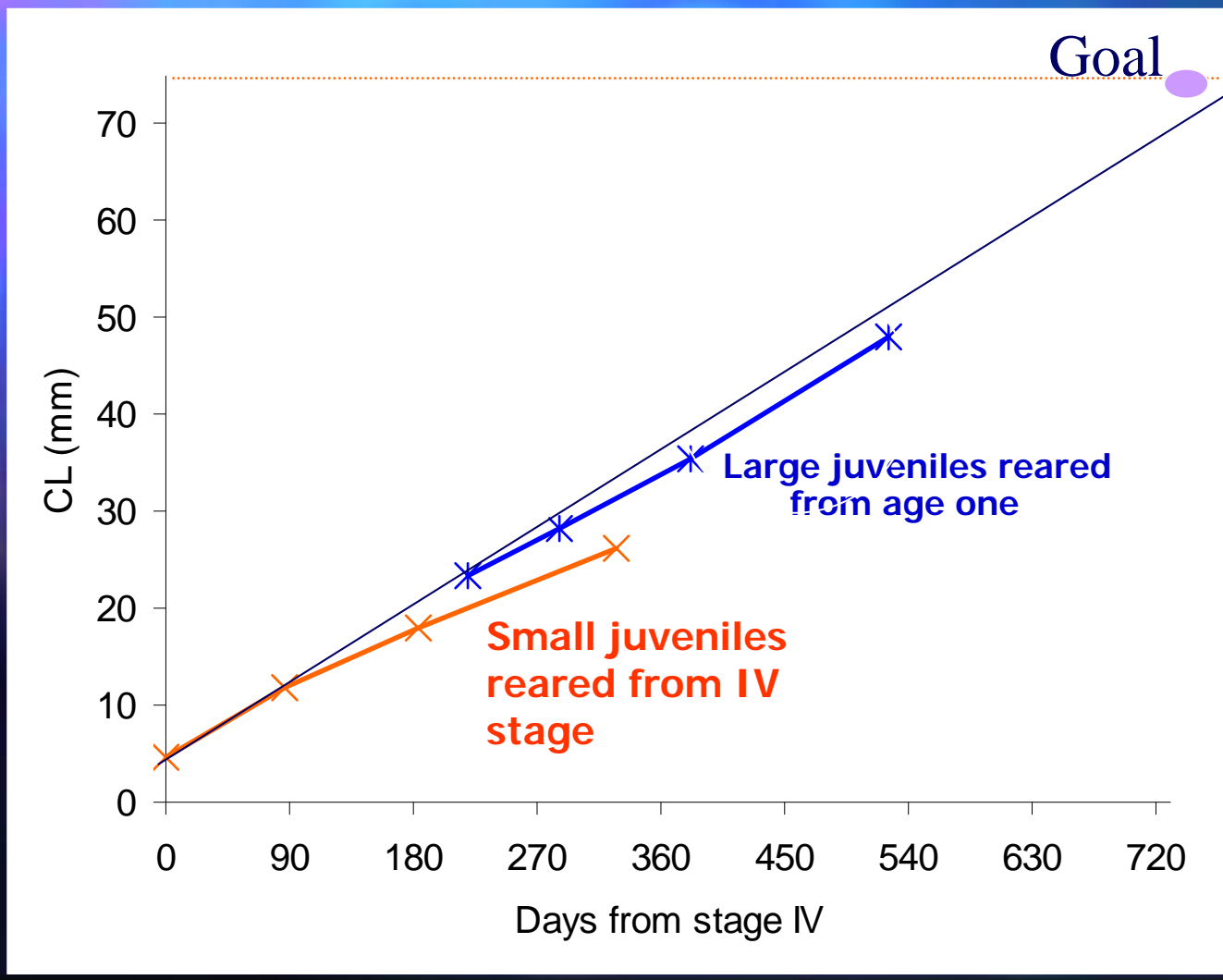
Development of technology

Market study

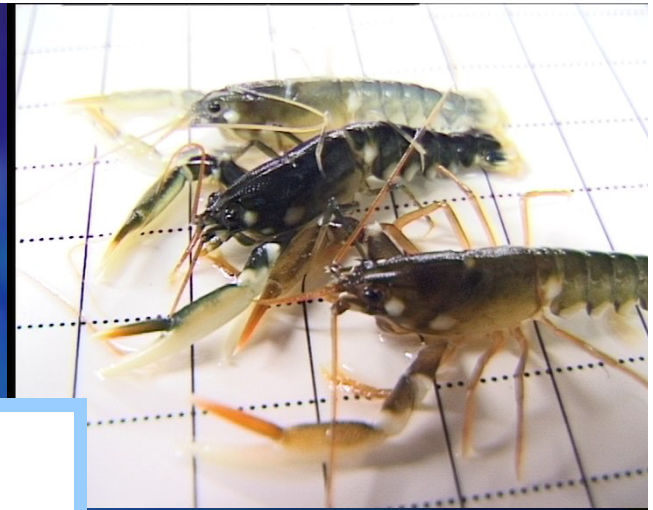




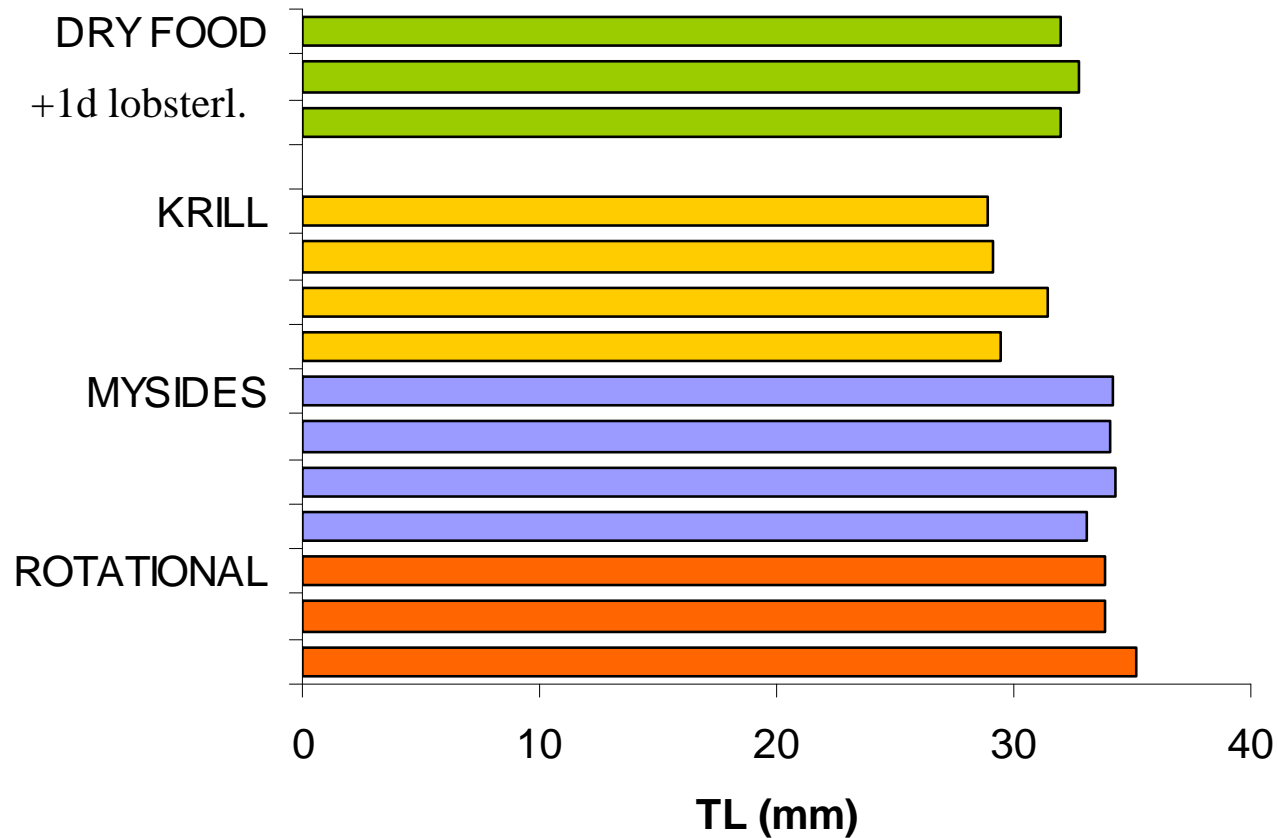
# Results: Growth rates



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Total length at 3 months at age



## Other results



- No effects of substrate or shelter on growth and survival in single confinements
- Little variation in growth between families (6 fam. tested)
- Shell sand in cages (V-stage) gives 90% crusher claws
- Shell sand doubles survival in communal tanks
- High survival on marine dry fish feed
- Weak pigmentation (pale blue) with marine fish feed
- Temperature variation may be lethal for lobsters close to moulting
- The first plate sized lobster produced had better taste and texture than wild lobster in blind test!





# Intensive farming Research priorities



- Dry food
  - Pigments, fatty acid and amino acid profiles, phospholipids...
  - Optimisation of diet
- Feeding and cleaning technology for small containers
- Water quality management
- Data on  $\text{NH}_3$ ,  $\text{CO}_2$  production for calculation of biofilter capacity
- Effective IV-stage production
- Area and water depth demands
- Product quality



# Extensive farming Research priorities

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- Production of low cost juveniles "born to be wild"
- Release strategies
  - Habitat (bottom type, depth, etc,)
  - Size at release
  - Release season
  - Predator control
  - Geographic location



# Main bottlenecks for intensive lobster farming

- A dry food for all stages of lobsters that :
  - gives growth rates and pigmentation like lobster fed natural food
  - can be accurately and rapidly fed in small portions to many small containers
  - gives lobster with "wild lobster" taste and meat quality
- An efficient "automatic" rearing system with:
  - A large numbers of small containers
  - Effective feeding and cleaning system
  - Safe and stable water quality (temperature, O<sub>2</sub>, NH<sub>3</sub>,...)
  - "Low" production cost
- Money for research and development





# Acknowledgements

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Einar Nøstvold (Kvitsøy Municipality)

Rudolf Svendsen, Ivar Kollsgård, Terje Ollestad (NLF)

Eva Farestveit, Knut Jørstad, Ann-Lisbeth Agnalt, and all other participants from IMR and Kvitsøy

Financial Support – Plate Sized Lobster project: Norwegian Governmental Regional Development Fund, Procean Ltd

Financial Support – Stock Enhancement Project: Norwegian Research Council

