Upscaling (marine) cage systems

Farming intelligence:
The control of the total process of farming by understanding the integrated use of equipment and the process of operations and combining this with knowledge of biological issues and the physical environment

Gunnar Senneset, SINTEF Fisheries and Aquaculture
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Better control and understanding will require developments within several areas:

- Decision support systems for handling increased complexity
- Sensors for monitoring biology, environment, equipment and operations
- Failsafe/redundant systems for autonomous and remotely operated equipment
Decision support
Farming intelligence: 1976
Current farming intelligence systems
Decision support complexity:

- Environmental parameters
- Operational parameters
- Location/site parameters
- Equipment parameters
- Direct input

RESULTS

PRODUCT PARAMETERS:
- Quantity
- Weight distribution
- Colour
- Fat content
- K-factor

Side products

MARKET PRICE NET PROFIT

FECAL MATTER
Future farming intelligence systems
Decision support system requirements

- Integrate knowledge from a wide range of disciplines
- Combine historical data with numerical models for prediction
- Low-cost, reliable and redundant sensors and communication systems
- Integrate data from multiple sources, including human experiences
Sensor systems
Oxygen measurements (same site)

Point outside cages, 3 depths

Cage A, 5m depth

Cage B, 5m depth, two sensors
Sensor and communication systems requirements:

- Reliable
- Redundant
- Low-cost (both investments and operations)
- Standardized interfaces for integration of multiple data sources
- Utilize new technology – e.g. Internet of things
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**Discussion:**
Where are the knowledge gaps?
- What are the future functional requirements for farming intelligence?