



# Research for our most important growth industry

Large-scale Programme  
Aquaculture – An Industry in Growth (HAVBRUK)



## Large-scale Programmes

The RCN initiative  
to meet national  
research priorities

Over the past 30 years, the Norwegian aquaculture industry has been transformed into the world's leading exporter of Atlantic salmon. Research has played a crucial role in this process.

In 2006 the Norwegian aquaculture industry produced over 600,000 tonnes of salmon and other production species with an export value of roughly NOK 19 billion. The Norwegian aquaculture industry is the leading global producer of Atlantic salmon and, together with traditional fisheries, is one of Norway's most important export industries. The industry has pioneered the farming of marine coldwater species, and Norway as a country is home to a knowledge-driven supplier industry that is oriented toward the international market.

Norwegian research groups are at the international forefront in key areas across the board in aquaculture research. The first aquaculture research stations, established in the early 1970s when salmon production totalled some 100 tonnes per year, have become important participants in research activities, along with the independent research institutes, higher education institutions and the aquaculture industry.

The Research Council of Norway has been engaged in aquaculture research activities since the 1970s, and has administered research programmes targeted toward aquaculture for more than 20 years. The Research Council allocates funding for approximately one-third of all Norwegian aquaculture research carried out today.

### The HAVBRUK programme

**Programme period:** 2006–2015.

**Annual budget:** approximately NOK 100 million.

**Target groups:** fish farmers, the research community, the supplier industry and the authorities.

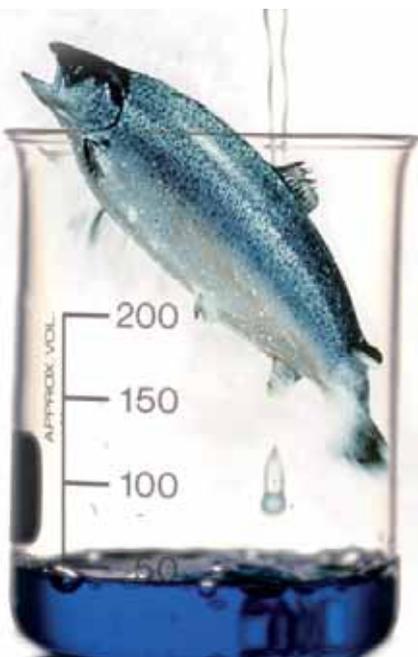
### Primary and secondary objectives

A primary objective of the research programme Aquaculture – An Industry in Growth (HAVBRUK) is to cultivate knowledge of high international calibre as the basis of a profitable and wealth-creating aquaculture industry based on sustainable, market-oriented production.

The programme is intended to:

- Further develop the salmon industry.
- Develop production of at least one new species and obtain knowledge about certain selected species with a view to commercialisation.
- Develop production within an acceptable framework with respect to sustainability, the environment, animal welfare and food safety.
- Secure long-term, strategic knowledge enhancement of a high international standard throughout the research community, industry and government administration.

**The HAVBRUK programme** encompasses the production of salmonids and other species throughout the entire value chain, including parts of catch-based aquaculture and sea ranching and the market for lightly processed products.





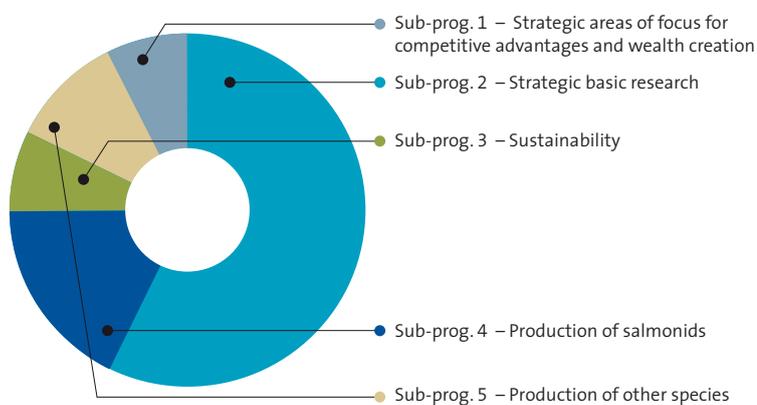
## Research results

Research and innovation activities have resulted in:

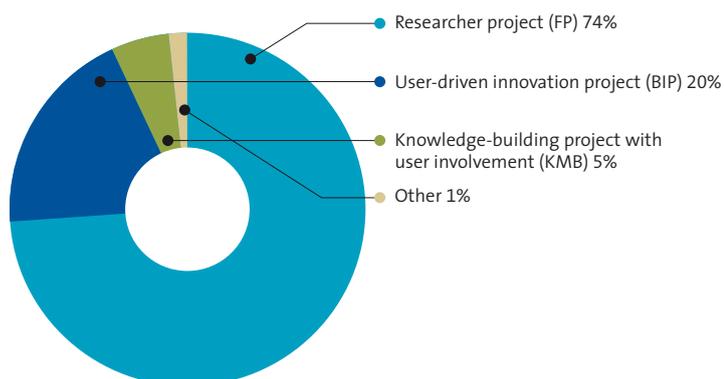
- Effective production methods for seafood that meets market demands.
- Vaccines and types of operations that minimise the risk of disease.
- Measures that reduce problems relating to salmon lice.
- An internationally unique, selective breeding system.
- Optimal feed for sustainable production.
- Equipment and technology for efficient and profitable fish farming under a variety of conditions.
- Knowledge to support sustainable resource management.
- Development of new production fish.
- Rapid, efficient transport and distribution of fish to consumers.

Together these results have generated billions of crowns for Norwegian fish farmers.

## Allocations by sub-programme (2006)



## Allocations by project type (2006)





## Aquaculture – An Industry in Growth (HAVBRUK)

*The HAVBRUK programme* is one of seven Large-scale Programmes established and administered by the Research Council of Norway. These programmes play an important role in strategic long-term knowledge development and innovation efforts to fulfil national research policy priorities.

*The HAVBRUK programme* leads the way with regard to strategic planning and funding of aquaculture research and is a key instrument in the follow-up of the Government's strategy for developing the Northern Areas.

*The HAVBRUK programme* analyses the aquaculture industry's overall research needs, and directs and funds research. Grants are awarded on a competitive basis, with assessment of grant proposals' scientific merit and benefit and relevance relative to the industry.

- The industry, the research community and government administration participate in formulating the strategic objectives and priorities of the programme.
- The work programme and action plan are the primary documents underlying all funding announcements.
- The programme encompasses the entire knowledge chain from strategic basic research to innovation and implementation of research-based knowledge.

*The HAVBRUK programme* incorporates collaboration across the entire research system:

- With two other RCN programmes, the Food Programme and the AREAL programme, on research on markets and on research to support industrial development, trade policy and land/sea use policy.
- With the aquaculture industry, the Fishery and Aquaculture Industry Research Fund (FHF) and Innovation Norway.

*The HAVBRUK programme* facilitates the use of new technologies within the aquaculture industry.

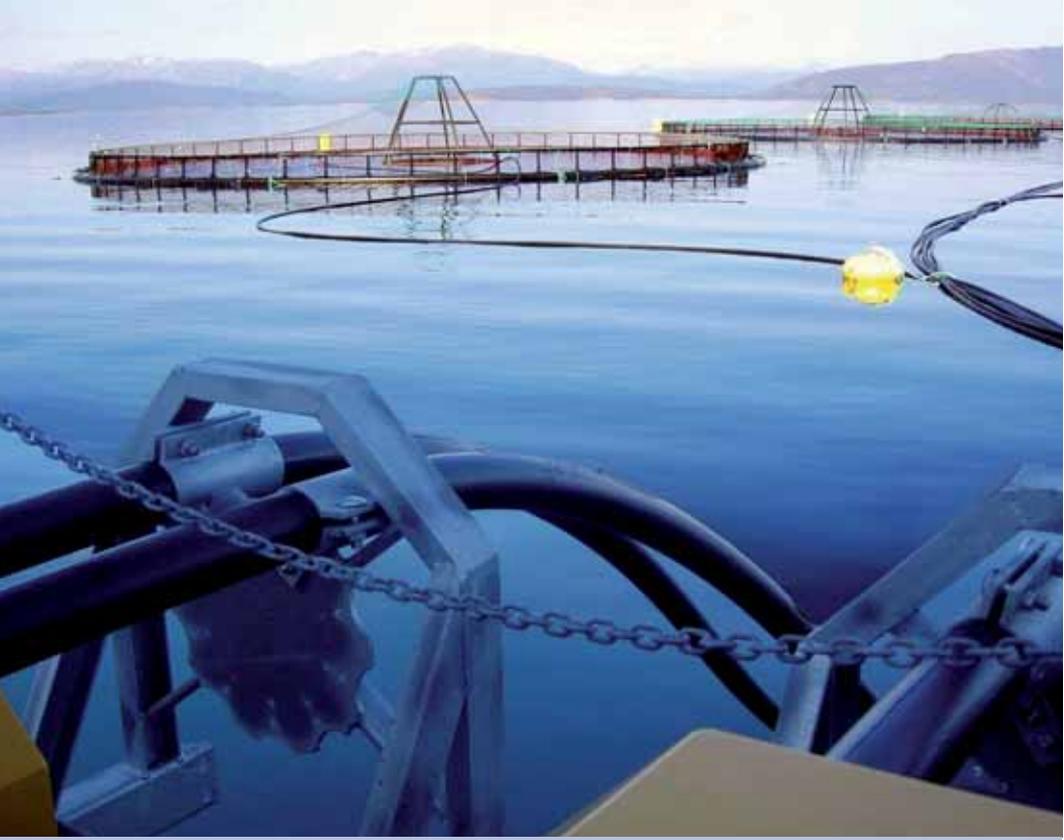
- Biotechnology opens new opportunities in areas such as selective breeding, fish health, vaccination and diagnostics, feed development, processing methods and monitoring.
- Nanotechnology may have a number of important uses, such as in construction materials and nets and as anti-fouling, as well as for monitoring and developing of new vaccines and new packaging.
- ICT-based solutions will be further developed for use in control and for monitoring of the production process, and for traceability and transport applications.
- In the new technologies area the programme collaborates with three other RCN Large-scale Programmes; the FUGE, NANOMAT and VERDIKT programmes.

*The HAVBRUK programme* is a key player and a driving force in the effort to increase international cooperation.

- The programme is the national contact point for R&D collaboration with researchers in North America on genome research, fish health and fish escapes.
- The programme is the national contact point for R&D collaboration with researchers in India on aquaculture and fish vaccines.
- The programme coordinates Norwegian efforts with relevant activities under the EU Seventh Framework Programme.

*The HAVBRUK programme*

- encourages a knowledge culture in the aquaculture industry.
- The programme provides support for events to disseminate knowledge.
  - The programme disseminates research findings via its own website, newsletters, fact sheets, books and reports.
  - The programme generates interest in aquaculture and aquaculture research by popularising information for the general public, and for children and adolescents.



## Research challenges

### **New feed resources**

A shortage of fish meal and fish oil resources makes it imperative to find alternative feed ingredients. These include plants from land sources and new marine resources, such as krill and plankton. Feed ingredients must ensure fish growth and welfare, as well as healthy, safe and good food.

### **New production species**

Each new production species has specific biological and environmental requirements which must be understood. This requires knowledge about health, feed, product quality, genetics and selective breeding, and the development of technology, equipment and operational solutions tailored to the needs of individual species. Research on cod alone is estimated to require funding of some NOK 130 million annually in the years to come.

### **Health**

Production fish must be healthy and content. Priority has long been given to the prevention and treatment of disease. The current health situation is basically good, and the use of antibiotics in the salmon industry is very low. New research challenges are emerging as the result of new diseases affecting both salmon and new production species.

### **Sustainability, the environment and animal welfare**

Up-to-date knowledge about sustainability, environmental issues and animal welfare is essential for providing the authorities with a basis on which to lay down key framework considerations for the sound development of the aquaculture industry.

- There is limited area available for aquaculture facilities, so new alternatives are being sought in more exposed sites. This gives rise to new requirements for operational and technological solutions that can fulfil fish's biological and environmental needs.
- Fish escapes from sea facilities must be avoided. This creates a need for research on biological, technological and operational solutions as well as on environmental and ecological impacts of escaped fish.
- Production fish are animals in captivity, which demands ethical and animal welfare considerations. It is crucial to find answers to the question of how to promote good fish welfare.

### **Food safety**

Aquaculture products must be safe, healthy food products. Accurate, high-level knowledge of the entire value chain is essential for a number of tasks, such as setting marginal values.



The leaflet can be downloaded from  
[www.rcn.no/havbruk](http://www.rcn.no/havbruk)

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