Submitted on Tuesday, July 14, 2020 - 15:40

Name(s) of person(s) speaking:
Brock Thomson, Innovation Director, Cermaq Canada
Amy Jonsson, Communications and Engagement Manager, Cermaq Canada
Linda Sams, Sustainable Development Director, Cermaq Canada

Organization Information
Organization you are representing: Cermaq Canada
Primary purpose of the organization: aquaculture , salmon farming
Number of members: 3
Contact name: Amy Jonsson
Meeting Details
Subject matter:
Update on the trial of the new semi-closed containment system we are launching this fall.
Specific request of the regional district, if any (i.e. letter of support, funding): No ask will be made, the delegation would be for information sharing only.
Requested meeting date: July 28 or Aug 11
Audio-visual equipment needed: we will be sharing a presentation

June 29, 2020

Cermaq Canada brings innovative, new technology to BC waters

Campbell River – Cermaq Canada will be trialing a new, innovative farm system at its operations on the west coast of Vancouver Island this fall. The new farming system is a semi-closed containment system (SCCS), which has been trialed from sea water entry to one kilogram in Norway with promising results. The system components arrived in Canada earlier this month, and assembly is now underway in Port Alberni. Once the SCCS structure is complete, it will be taken by barge to Cermaq's Millar Channel farm site in Clayoquot Sound.

"After years of planning and coordination, and in cooperation with the Ahousaht Nation leadership and Cermaq Global, we are excited to have commenced assembly. This is the first step leading up to the planned stocking of the SCCS at our Millar Channel farm site, off the west coast of Vancouver Island in Clayoquot Sound, in the traditional territory of the Ahousaht First Nation, later this fall," says David Kiemele, Managing Director for Cermaq Canada. "This first of its kind system outside of Norway, uses a patented material to form a fully enclosed lining, or bag, to encompass the SCCS structure. Water is pumped into the system through four screened sea water intakes, and exits the bag through 12 deep-level screened ports. The bag remains pressurized through continuous and positive water flow. This will essentially eliminate lateral contact between wild and farmed salmon, which has benefits to both populations. The system also allows for greater precision in farming by providing increased oversight of the environment inside the system by controlling water temperature, dissolved oxygen and preventing sea lice and algae from entering the system."

Naturally occurring algae, some species of which can be harmful to fish, and sea lice are usually found in the top layers of the water column. The new system will allow Cermaq Canada to set the sea water intakes below this depth, which will intentionally limit the introduction of these two organisms into the farm system.

"These sea water intakes are able to be set at site specific depths which provides many benefits. We will investigate setting the intakes at deeper depths, to limit introducing sea lice and algae and to stabilize the environment in the system. This evaluation is a key component as we assess the technology for future use in British Columbia," says Linda Sams, Sustainable Development Director for Cermaq Canada."

The SCCS may be a companion to existing systems and farming techniques. It will be Cermaq Canada's first step towards an "on-farm application" of this exciting and innovative technology.

"We are just finishing our second trial producing one kilogram salmon, in a semi-closed cage in Norway, similar to the one being deployed in Canada, and we are very excited by the results. During both trials, a control system was anchored adjacent to the new SCCS. The fish within the SCCS showed consistently better growth, overall improved performance and almost no occurrence of sea lice within the SCCS. We are looking forward to testing this technology under Canadian conditions, which we know are quite different than those seen in Norway," added Kiemele.

The system was designed and built by FiiZK in Norway and shipped in components to Canada. After reviewing several proposals, Cermaq Canada selected Canadian Maritime Engineering (CME) to oversee and manage the assembly.

"We will be using local labour, including pipe fitters, safety and security for the duration of the assembly which is expected to take approximately eight to 10 weeks," says Jim Drummond, Lead Project Manager for CME. "All assembly will be located within the CME Canal Beach location in downtown Port Alberni and we look forward to working with representatives from FiiZK and Cermaq on this new system."

Applying our knowledge and technology across regions is priority in Cermaq. Trialing the SCCS in BC will test the system against other challenges and risk than seen in Norway, and give knowledge about the potential for the SCCS in BC. Upon completion of this project, Cermaq will develop a roadmap for potential SCCS implementation in parts of our operations, including the description of required technology improvements and potential of suitable sites for this type of system.

Semi-closed containment system timeline and quick facts:

- Assembly of the system will take approximately eight to 10 weeks, and is scheduled for completion in late summer. Once completed, the system will be taken by barge to Cermaq's Millar Channel farm site in Clayoquot Sound, in Ahousaht Territory, for anchoring, and further completion. The system is scheduled to be stocked in November 2020, with harvest expected in the late spring or summer of 2022.
- The SCCS can be located at existing salmon farm sites, and uses a large, water-pressurized bag system which is made of a flexible polymer material that sits outside of the traditional netting system – creating an impenetrable barrier between the open ocean and the inside of the pen.
- Water is pumped into the salmon pen through four sea water intakes that are capable of pumping 300 cubic metres of water per minute, which allows for the creation of constant water circulation through the 12 deep-level ports.
- As the lining maintains constant water pressure and movement thanks to the intake pumps and the lower level ports, there is no risk of the bag "deflating".
- The system can be customized to specific sites, based on depth, dissolved oxygen levels, and water temperatures.
- The system will be the first of its kind in Canada, but has shown promising results in Cermaq Norway where two trials of salmon, reaching up to one kilogram, have been conducted.
- Once pumped into the system through the screened intakes, water exchanges within the system in approximately 50 minutes.
- The tensile strength of the system is strong – at 1300/1300 daN/5cm – and can easily withstand storm activity and predator attacks.

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For more information, please contact Cermaq Communications and Engagement Manager, Amy Jonsson at 250-202-7680, or by email at amy.jonsson@cermaq.com.

Cermaq's Semi-Closed Containment System
What is it and what does it do?
Quick Facts and Frequently Asked Questions (FAQs) ***Summer 2020***

Background

- Traditional salmon farming – in open pens – requires specific management for naturally occurring factors such as water temperatures, oxygen levels, algae as well as pathogens and sea lice. In certain circumstances, these can be variable.
- Variable factors impacting farmed salmon:
    - Water quality – including harmful algae, temperature and dissolved oxygen;
    - Pathogens and pests – sea lice and naturally occurring virus and bacteria found in the ocean;
    - Incidental catch – wild fish entering the farm pens; and
    - Predation – marine mammal interactions with farmed salmon can lead to increased stress for the salmon as well as net damage.
- As farmers, we look to ensure production performance is stable and as predictable as possible.
- Research into other potential farming methods for Cermaq Canada - such as land-based aquaculture – have proven to be less attractive due to cost, environmental impacts, fish welfare concerns, increased carbon footprint and flavour changes.
- The creation of the semi-closed containment system (SCCS) is showing promise as a way to continue to farm in a predictable, stable manner while retaining all of the benefits of ocean farming - with less risk.
- Cermaq is trialing a SCCS in Norway and has completed two generations.
- The trial results from Norway have been very encouraging, as the post-smolt farmed in the SCCS system have experienced overall better growth and did not require treatment for sea lice in comparison to the salmon placed in an adjacent control cage of a conventional farm system.

What is a Semi-Closed Containment System (SCCS)?

- The SCCS will provide increased levels of control for both the biosecurity and welfare of both farmed and wild salmon.
- A SCCS can be located at existing salmon farm sites, and uses a large, water-pressurized bag system which is made of a flexible polymer material that sits outside of the traditional netting system – creating an impenetrable barrier between the open ocean and the inside of the pen.
- Water is brought into the salmon pen through four screened sea water intakes that are capable of pumping 300 cubic meters of water per minute. This creates constant water circulation through the 12 deep-level screened exit ports.
- Once pumped into the system through the screened intakes, water exchanges within the system in approximately 50 minutes.
- The sea water intakes can be set to match the farms location and conditions – making them tailored to each unique site.
- As the lining maintains constant water pressure and movement thanks to the intake pumps and the lower level exit ports, there is no risk of the bag "deflating".
- Organic waste exits the pen through a single exit at the bottom of the polymer bag. This creates the opportunity for the collection of solid fish waste in the future as technology become available.

What are the benefits of a SCCS?

- The system can be customized to specific sites, based on both physical and biophysical characteristics such as water conditions, depth and dissolved oxygen.
- Algae and sea lice are generally found in the top portion of the water column. By using the sea water intakes, we are able to avoid this water column and thereby, minimize the introduction of algae and sea lice into the system.
- The SCCS greatly reduces the interaction between farmed and wild salmon – which also reduces the transfer of pathogens and sea lice between wild and farmed populations.
- The tensile strength of the system is strong – at 1300/1300 daN/5cm – and can easily withstand storm activity and predator attacks.

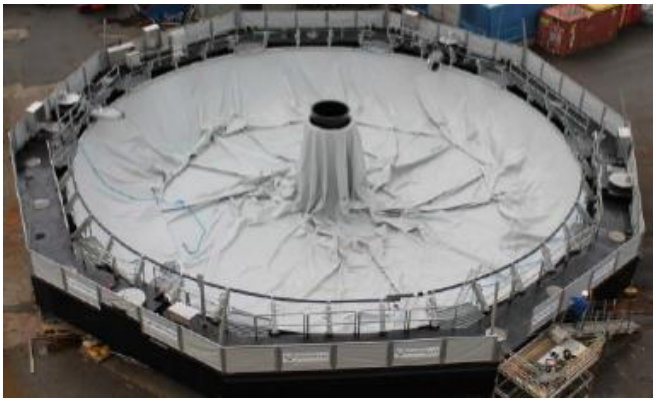
What questions will the trial answer?

- Trialing this system will provide a clearer picture on the effectiveness of minimizing interactions (harmful algae, sea lice and pathogens) between the environment and the fish inside the SCCS.
- Understanding how to adequately meet the changing oxygen demands as the fish grow within the SCCS system.
- The cost of the SCCS system is considerably more than traditional farming systems – up to five times more. The system will need to deliver on ecosystem objectives, fish performance and fish welfare measures.

Frequently Asked Questions (FAQs)

1.) How big is a SCCS compared to traditional open net pens?

A. The SCCS is a circular pen – similar to a polar circle type farm, and has a circumference of 120 metres and is 24 metres deep. The pen is capable of holding at least up to 750,000 salmon.



Left: *assembled polymer bag and flotation ring*

Right*: one of the sea water intakes*

2.) Has this technology been tested or proven in local waters?

A. Cermaq has been trialing a SCCS in Norway, and has completed two generations. The first round of fish placed in the system had overall better growth and health paired with a lower mortality rate, and we are seeing similar success with our second group of fish in the system. With this second batch of fish, there have not been any sea lice in the SCCS, while the reference cage nearby had to be deloused twice. The growth has been very good and the average weight in SCCS was significantly higher than in the reference cage.

3.) What happens if the bag tears?

A. The bag has a tensile strength of 1300/1300 daN/5cm – and can easily withstand storm activity and predator attacks. In the case this were to occur, there is a secondary barrier – the interior predator net – which would provide secondary protection and prevent potential fish escapes.

4.) Can other fish or mammals enter the system?

A. This would be very unlikely. The polymer bag is built to withstand predator attacks, and the system has an inner a predator net within the bag. The intake pumps and deep-level port are both screened using a netting similar to the predator nets. This will prevent any accidental by-catch from the intake pumps, and the remote possibility of fish or mammals entering through the deep-level parts. It is important to note that the deep-level exit ports will have continuous strong outflow, making entering through these ports very challenging.

The Semi-Closed Containment System (SCCS) being trialed in northern Norway

Side view of the Semi-Closed Containment System