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Chair

Mr. Rodney Weston

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● (1535)

[*English*]

The Chair (Mr. Rodney Weston (Saint John, CPC)): I call this meeting to order.

I'd like to take a moment to thank our guests for joining us today, Mr. Walker by video conference and Ms. Walling here in person.

I really appreciate you taking time out of your busy schedules to join the committee today and to share with us your thoughts on the study we're undertaking at this point in time on closed containment salmon aquaculture.

If you're not familiar with the procedures of the committee, we generally allow about 10 minutes for opening comments from our guests. Then we have certain time constraints on members for questions and answers to try to allow as many questions and answers as possible here within the timeframe. So if I interrupt you, please don't be offended. It's just in the interest of trying to make sure everyone gets their opportunity to ask questions of you.

I'm not sure if we had an agreement about who's going to go first.

Ms. Walling, why don't you start first with your opening comments?

Ms. Mary Ellen Walling (Executive Director, British Columbia Salmon Farmers Association): Thank you very much for the opportunity to speak with you. I live in Black Creek, just south of Campbell River. I work in Campbell River. My office is located there, but I was here in Ottawa for the seafood value chain round table meetings earlier this week, so I have taken advantage of the lovely weather in Ottawa and stayed an extra day or two.

Thank you very much for giving me the time to speak with you today. I am the executive director of the B.C. Salmon Farmers Association. The BCSFA represents salmon farming companies operating in British Columbia as well as the service and supply sector that supports them.

Together, our sector provides 6,000 direct and indirect jobs, the majority of which are in remote or rural Vancouver Island communities, such as Port Hardy, Port McNeill, Klemtu, Gold River, Ahousaht, Ucluelet, Tofino, Sechelt, and others.

B.C. has, on average, 75 farms in operation at any given time, producing around 75,000 metric tonnes of salmon each year. This is significant economic activity in our province, representing about $800 million in provincial revenue each year, but the B.C. industry produces only about 3.5% of the world's farmed salmon. We're a big player in the province of British Columbia but a very small player on the world stage.

As you likely know, because of your work here at this committee, we are about to mark the first year anniversary of having the Department of Fisheries and Oceans as our primary regulator. The regulatory transfer that happened in mid-December last year has meant a significant amount of work for DFO and our companies as all of us navigate this new environment. There have been some challenges along the way, but we remain confident that as the regulation settles into place, there will be opportunity for streamlining operations in British Columbia.

Movement in this area will be important in the coming years as efficiencies in our operations become ever more important. With the price of salmon dropping significantly in the last six months and forecasts that this downturn will be somewhat sustained, our farm companies are being stretched to the max. But I know you have not asked me here so you can listen to an economic update. You have questions about closed containment, and we're glad you offered us the time to provide some answers.

Salmon farmers, particularly those in British Columbia, are actually on the leading edge of land-based recirculation technologies. With state-of-the-art facilities, we raise our fish in closed containment tanks for the first year of their lives.

I know that my colleague Clare Backman from Marine Harvest Canada came and spoke with you a couple of weeks ago about the innovative work being done with his company and the lessons being learned through research and further investigation both by our members and by other aquaculturalists.

However, there are still questions—those at a practical level about the technology and those at a philosophical level about why this is such a focus and how we as protein producers can continue with the lowest impact on the environment.

All calculations and the development-scale projects currently under way require the fish to be held at a significantly higher density than they are found in the ocean. That condition is not good for fish health and fish welfare. The cost of energy to run such facilities would be significant, both financially and environmentally, and the locations where these facilities could be operated are limited by the requirements for each facility.

All of these considerations would mean this technology, if it's developed to a commercial fish farm scale, would likely not operate in the areas where our companies work now. That is important to note for the rural Vancouver Island communities that look to us for stability in their resource-dependent economies, and that could have a significant effect on our many first nations agreements.

Taking a step back too, we have to consider the reasons we're having this discussion in the first place. Opponents to the aquaculture industry are insisting that salmon farming should be done on land, on the premise that our business harms the environment. That's based on presumptions that are simply false.

Our activity in the water, like any other activity in water or on land, has an impact. The goals of good management are to assess any risks of that impact and to manage them in the best way possible. We believe we're doing that well.

As we saw at the Cohen commission, despite significant propaganda to the contrary from farming opponents, the experts retained by Cohen looking at salmon farming could not find any statistical connection between salmon farm production and the returns of Fraser River sockeye, low or high.

Moreover, recent allegations about a connection between salmon farming and ISA have been proven completely false. I raise these points because they provide important context for the present discussion. Closed containment is being touted as a replacement for open-net aquaculture, not a supplement to it. Make no mistake, there are activists who seek to end our industry, and the false allegations that have been put forward to the Cohen commission and through the news media continue to be proven false.

We have a tremendous opportunity in this country—and I will speak for British Columbia in particular—to become a world leader in the raising of salmon as a healthy, nutritious, and affordable protein. Canada has all the natural assets to be leading the world in salmon farming, and we have so much potential to grow.

● (1540)

Producing for global demand of B.C. salmon using closed containment as the method is simply not an option. It is far too energy-intensive. The density means that the product is less healthy, therefore requiring far more treatment with antibiotics, and the capacity is simply not realistic. Closed containment could not even touch the current capacity of open-net farming, let alone be able to increase current farming levels dramatically to meet the world demand for Canadian salmon.

Our companies and my members have proven themselves time and again to be proactive, productive, responsible and innovative. They have always quickly adapted to engage new technologies where it can improve the management of their farms. The adoption of full recirculation systems in our hatchery stages is one very good example of that. That's the appropriate role of closed containment in our aquaculture industry. It does that well. We encourage additional research and development to make it even better, but it's certainly not a replacement for the industry as a whole, from hatching to harvest.

I encourage this committee to support the overall salmon farming industry in British Columbia and in Canada, and to recommend policy that favours its growth and careful expansion. We have a top-notch product, we should be further developing it, and along with researching opportunities for our future, we do have to ensure that our present is strong and successful.

Thank you very much for the opportunity to be here. When we get to the question period, I will be happy to answer any questions you may have.

The Chair: Thank you, Ms. Walling.

Mr. Walker, you'd like to make some opening comments?

Mr. Robert Walker (President, AgriMarine Industries Inc.): There's just a point I'd like to make.

Peter McKenzie is here from Mainstream as well. I just noticed that his name tag is sitting beside Mary Ellen, so I wanted to make sure you know he's present.

The Chair: Thank you very much.

Mr. Robert Walker: Thank you very much.

It's my honour to address the Standing Committee on Fisheries and Oceans. My name is Robert Walker, and I am president of AgriMarine Industries. We're a publicly listed B.C.-based company in the business of developing and commercializing non-polluting salmon farming technology and salmon farm systems, as well as producing salmon on our own.

I was pleased to host members of the committee last November at our demonstration farm in Campbell River. A year ago we were in the process of assembling the world's first commercial-scale, marine-based, solid-wall enclosed system. Since then we've met a number of milestones. We successfully launched the tank in Middle Bay in January of this year, and we stocked it with 56,000 chinook smolts. They are currently at 1.34 kilograms and were entered at 35 grams less than a year ago.

We are pleased to report that the fish are not infected with sea lice, which is a key area of interest for our industry, of course. There have been no predator interactions. We're collecting and removing solid waste using our proprietary waste system. Because of our innovative clean technology and sustainable rearing practices, we have a signed a four-year agreement with a major U.S. grocer for the supply of chinook salmon. Finally, our demonstration facility is garnering media and industry attention from all over the world. I would like to take this opportunity to invite the current members of the committee to visit our site in Campbell River as well so you can see what we're doing.

The issues associated with salmon farming in Canada and other nations around the world have been well documented, and the industry is under pressure from both consumers and environmental groups to take action against the consequences of things such as lice infections, fish escapes, nutrient enrichment, etc. Net cage operations are often blamed for fostering disease and sea lice infestations. Retailers have responded by announcing sustainable sourcing policies so they're forcing us to relook at what we're doing.

We're calling on the B.C. and federal governments to support further innovation for clean technologies that will allow sustainable growth in the salmon farming industry and protect the environment. AgriMarine believes that its technology provides a solution to the issues that are plaguing the industry and can assist in creating a smooth transition into closed containment in a marine environment.

During a four-year, land-based closed containment trial, we successfully reared and harvested Atlantics, chinooks, and coho salmon and proved the viability of raising healthy salmon in a solid-wall containment system. The Cedar Project also demonstrated that land-based flow-through systems are not economically viable. Energy costs, land costs, costs of construction of land-based tanks, and the difficulty of building tanks large enough to hold an economically viable amount of fish all combine to make the systems too expensive.

AgriMarine took the positives that we learned from Cedar, went back to the drawing board, and tested various designs and materials for a marine-based tank. We concluded that a composite of reinforced fibre and foam construction, somewhat akin to windmill blades or yacht construction, provide the best specifications for materials. We now have a floating, solid-wall containment tank system that can be deployed in fresh or marine environments, warm or cold climates. We believe that AgriMarine's design solution offers a superior alternative to land-based systems and is a great transition for open nets. By floating solid-wall tanks in natural water bodies, AgriMarine provides an optimal rearing environment for fish husbandry through four primary means. We regulate water flow and temperatures, we monitor and supplement dissolved oxygen levels, we remove the threat of predation, and we remove waste that can be disease vectors and toxins.

Our technology provides what net cage farms cannot. These features allow us to farm in adverse conditions year round and operate well above density levels practical for net cages without causing undue stress to the fish.

The solid-wall system also contributes to a healthier surrounding ecosystem. AgriMarine's proprietary waste removal system channels settleable fish waste into a separator where we de-water it for eventual composting. The waste removal process eliminates the undesirable addition of nutrients to local marine ecosystems. With solid-wall containment there's no possibility of interaction between farmed and wild, no fish escapes, no predator interactions.

Another competitive advantage of the company's technology is in its control of feed. In solid-wall containment, discharge of uneaten pellets to the environment is prevented. Aside from the economic implications, the loss of even 1% of uneaten feed can cause significant and disruptive introduction of nutrients into the marine environment as well as attracting unwanted wildlife.

AgriMarine's system offers superior food conversion as well as isolation of the farmed fish. On-farm energy consumption is only a small part of the total energy and greenhouse gas footprint incurred to deliver cultured fish to market.

● (1545)

We estimate that AgriMarine's energy usage is about one-tenth of a comparably sized, land-based containment system, and this energy impact is further offset by our feed utilization efficiency, reduced benthic impacts, and proximity of the farms to market.

AgriMarine's operating costs are comparable to the present net cage industry and offer a sustainable and economical solution to the present challenges of farming. With over 10 years of development experience, we know that salmon thrive in a controlled environment such as the system we offer. The constant flow of new water at a comfortable temperature with constant supplementation of oxygen, combined with the lack of external stressors such as poor quality water and predators, ensures that the rearing environment is excellent for our stocks. This, in turn, reduces or eliminates the need for antibiotic treatments. We've not treated any of our fish to date at Middle Bay.

While the culture of each species presents a unique set of challenges, neither the Atlantic nor Pacific salmon species we've grown have had lice infections. The solid-wall tanks and separation of species from effluent water help the farmer to ensure that disease organisms are not spread between fish groups on the same farm or between wild and farmed fish.

Some studies have shown that sea lice that affect salmon do not occur or have very low incidents in deep water. There's also evidence that moving oxygenated water repels sea lice. The AgriMarine system has the capability of drawing water from a depth, thus avoiding the upper trophic regions in which sea lice thrive. The in-tank water is oxygenated and constantly refreshed.

The company entered a commercial and technology agreement with the not-for-profit Middle Bay Sustainable Aquaculture Institute for the construction and operation of a four-tank, commercial-scale marine farm utilizing our technology. We then subsequently signed a consortium agreement with the Gordon and Betty Moore Foundation and Sustainable Development Technology Canada for grants in support of the project. As a result, the first marine-based, commercial-scale tank was launched this past January. Three additional tanks will be launched in 2012—prior to June 2012.

AgriMarine has a fully operating farm in China as well using the same technology, but we're in freshwater there, growing Pacific salmon and rainbow trout. We've proven the technology there, with two harvests and sales of those harvests, and we're now in negotiations for additional sites.

Regarding economic benefits to British Columbia, we believe that AgriMarine is providing real economic and social benefits to British Columbia through job creation, investment in clean technology, and ocean stewardship. Farmed salmon has been B.C.'s largest agricultural export for over six years. Favourable water conditions on the west coast of B.C. create the potential for significant growth in the salmon industry.

However, with growing pressure to move the industry into closed containment systems on land, and with reduced output due to a lack of new or expanded licences, industry growth has been stifled. With government support in areas such as licensing or tax incentives, AgriMarine could aid in the growth of aquaculture in this province and assist in job creation, while addressing the environmental issues of such an economically important industry.

Most of the direct employment comes from work in the processing of farmed fish. So when you farm it could produce perhaps six or eight jobs, but also produce jobs in processing of up to twenty, and then multipliers beyond that for supplies and services. Communities that have long opposed traditional net cage farming due to its negative impact, or perceived negative impact, on the environment may deem AgriMarine's technology as a solution to the issues facing this industry and as a vehicle for economic development in their territories.

Because of reduced demands on the environment, floating containment farms can be located in a greater variety of locations, perhaps adjacent to towns where farm workers live. By offering a sustainable alternative to current salmon farming practices, AgriMarine can bring vital jobs and economic development to coastal regions and isolated communities that, because of environmental concerns, simply will not entertain conventional net cage farms.

Transitioning to marine-based, solid-wall containment is currently the only acceptable, environmentally sustainable economic model for the industry. Net cage farms currently in place could be converted easily to the AgriMarine systems. We believe that the AgriMarine system for aquaculture will contribute to a future environment of sustainability and economic well-being for the industry, both in B.C. and in Canada.

Thank you for your time.

● (1550)

The Chair: Thank you, Mr. Walker.

Mr. McKenzie, you have some opening comments.

Dr. Peter McKenzie (Veterinarian and Fish Health Manager, Mainstream Canada): Thank you, Mr. Chairman, and thank you for the opportunity to speak to the committee today on closed containment.

My name is Peter McKenzie. I'm a veterinarian. I've been working in the aquaculture industry for over 10 years and I've worked with multiple different versions of closed containment systems through that time. I've also spent a few years with the Canadian Food Inspection Agency as a national manager for import-export for the aquatic animal health division.

Today I'd like to speak to the committee on behalf of Mainstream Canada as their veterinarian and fish health manager.

Mainstream is one of the largest aquaculture companies in British Columbia and is a part of the global Cermaq Group, whose business is responsible for fish feed and farming in operations in Norway, Chile, Scotland, and Canada.

Cermaq and Mainstream's corporate mission statement is for sustainable aquaculture, and our corporate vision is to be the global leader in sustainable aquaculture.

Today I am here to convey Mainstream Canada's views on the existing closed containment technologies for the purposes of commercial finfish production. However, considering my knowledge base and my expertise in the area of fish health, I would like to touch on the biological limitations that are in place with closed containment technologies, particularly in the area of fish health, disease transmission, and animal welfare.

Mainstream Canada strongly believes that the existing open-net pen technology and our production practices allow for sustainable aquaculture, and we aim at demonstrating this through our daily operations and monitoring activities.

We'd like to start by saying that we recognize that the only true closed containment technology is the fully land-based recirculating aquaculture system, or RAS technology, where there is complete physical separation of water and animals from the surrounding environment. Mainstream believes this technology can be very effective in early life stages of fish culture, and as a result has invested in this technology in our land-based facility in Duncan, British Columbia.

In our opinion, the use of closed containment technology for the purposes of production of salmon to market size is not sustainable. Aquaculture sustainability by definition is a mixture of social, environmental, and economic sustainability for long-term survival of the industry.

True, RAS technology, as I mentioned, can address the environmental sustainability issues that have been mentioned previously by eliminating those interactions with the surrounding environment and controlling inputs and outputs from the system. However, concerns remain regarding energy use and fish health and welfare implications that I will touch on in a minute.

Closed containment systems like the RAS system also do not support principles of social sustainability, as we understand them. The main social impact of open-net pen systems is the benefit for rural and coastal communities in British Columbia, the majority of those being first nations with limited access to other sources of jobs. Closed containment, if it is used on a massive scale, would need to be strategically located in the proximity of urban zones or markets where they have access to energy and land.

Closed containment, such as the RAS system, is also not economically sustainable, in our view. The models are highly dependent on massive capital expenditures for start-up, availability of large parcels of land near the ocean, and consistent high prices from customers for the product, all of which are not easily accessible in Canada today.

The reality is that our fish are sold on a commodity basis, and current commodity prices will make all existing models unprofitable, subsequently making it impossible to access the necessary capital to start up these endeavours. Customers are not willing to pay a premium price for a product produced in a closed containment system in a commodity market. Premier prices will only be realized in limited niche markets.

Worldwide production of Atlantic salmon is estimated at 1.5 million tonnes in 2011 and an additional 200,000 tonnes for 2012. This will just put increasing pressure on the commodities market. Therefore, it is our view, as a global commodity, that closed containment will never be a viable alternative for the production of Atlantic salmon on a commercial scale.

In addition to the shortcomings in social and economic sustainability, all closed containment models that have been reviewed through DFO's SEP process were highly dependent on biological performance of the fish that comes very close to, if not surpassing, the physiological limitations of fish.

● (1555)

As of now, much of the debate on closed containment systems has revolved around engineering theory, theoretical profitabilities, and financial models; however, the one thing that every model culture system is solely dependent on is the biological performance to be successful. For this reason, the fish health and welfare considerations need to be considered.

These physiological limitations need to be considered. Closed containment technologies rely heavily on the manipulation of water temperatures, chemistries, densities, and the surrounding environment in order to hit theoretical values for maximum survival and production. There has been little consideration for the biological limitations of animals and conditions necessary for allowing a natural swimming behaviour and low-stress environments. As a result, I would like to just briefly touch on the implications of closed containment systems on animal welfare and disease transmission.

Fish welfare has been recognized globally as a critical aquaculture consideration. The World Organisation for Animal Health, or OIE, the Royal Society for the Prevention of Cruelty to Animals, the Canadian Council on Animal Care, and the Compassion in World Farming associations are examples of welfare experts who have taken the time to go through the science and develop standards for fish culture. All of these groups have come to the same conclusion, that water quality and fish density are critical parameters for maintaining fish health and welfare.

In summary of their standards, increasing densities result in elevated stress levels on fish, increased competitive interactions, restrictions to natural behaviours, and reduced water quality. Therefore, they've come up with maximum recommended levels of 17 to 22 kilos per cubic metre. Open-net pen systems currently operate with maximums of 15 to 17 kilos per cubic metre. However, the RAS technologies that have been discussed previously rely on densities of 55 to 65 kilos per cubic metre in order to be viable.

Natural swimming behaviour is also limited in these situations, as constant water flows are required in order to remove organics and to preserve water quality levels. Fish rely on transitions in water currents, slack tides, and salinity changes in order to perform their natural behaviours.

In the area of disease, with increasing densities and other stressors such as water quality compromises, fish will produce elevated levels of the stress protein known as cortisol. Elevated cortisol levels will react directly on the immune system of the fish, reducing the immune system and making these fish even more susceptible to disease.

Closed containment systems need to rely on water reuse and elevated temperatures to evaluate production goals. However, the manipulation of these temperatures also creates the perfect environment that enhances pathogen culture. As a result, with increasing densities and water quality compromises, there is a high risk of disease occurrence and outbreaks. Disease transmission can occur in any production system and is directly dependent on the frequency of animal interactions and water replacement rates. The number of fish interactions is a direct result of fish density. Therefore, increasing densities increase the speed and risk of disease spread within a population. Increasing water reuse and densities will also result in higher pathogen concentrations, leading to more severe outbreaks of disease.

In summary, Mainstream Canada recognizes the only true closed containment technology is the RAS technology. However, we do believe that it is not a sustainable solution for the commercial production of salmon to market size. We recognize that this technology can be utilized effectively for the production of Atlantic salmon during early life stages, and possibly for commercial production of salmon for the purposes of small niche markets.

Mainstream Canada is also committed to utilizing production systems and practices that optimize fish health and welfare standards, allowing our fish to perform and our operations to remain sustainable and to produce a healthy, affordable product.

My hope, in speaking to the committee today, is that you will realize that there are biological limitations to the systems we are working with and that it is not simply an engineering or economic discussion.

Thank you.

● (1600)

The Chair: Thank you very much, Mr. McKenzie.

We'll move right into questions now.

Ms. Davidson.

Mrs. Patricia Davidson (Sarnia—Lambton, CPC): Thanks very much, Mr. Chair, and thanks very much to each of our presenters here, both in person and by video conference. We've certainly heard some very interesting information this afternoon, and it's going to be very helpful to this committee.

I'd like to start my questions with Ms. Walling, please. You certainly belong to an interesting organization, and it sounds as though it's extremely busy and productive, so you've got a good organization going there, by the sounds of it.

I was interested in your comment regarding the likelihood that closed containment operations would operate in quite a different geographic area than the fish farming areas are in right now. I think we've heard from other people that they could be located anywhere. Right now we're looking at rural, coastal areas, and as you have pointed out, it's at mainly a lot of first nations communities where that's certainly one of the only—in some cases the only—economic boosts they may have.

We've heard from other people that the land-based area is not a concern, that they could go anywhere, and when you're saying that you think they probably would be located in other areas, I think you're maybe saying the same thing. Would we be looking at economic devastation to our local coastal fishing communities, for one thing?

If they are in different areas, how does that impact the land supply issue and the price of land? How does that get balanced?

Another thing we've heard quite a bit about is the cost of energy.

Ms. Mary Ellen Walling: Those are lots of questions in one question.

It's certainly a concern for me. I started my career in salmon farming. I came from a community development background and was working with North Island College as the director of training and community development. I got involved with the Kitasoo/Xai'xais First Nation and their protocol agreement with Marine Harvest Canada, where we were providing training in that remote community of Klemtu.

In Klemtu, I started to visualize what closed containment would look like in a community that size, where you don't have access to power. You have diesel power there to run your electricity. They have a small hydro station, but power supply is a big issue. They don't have a large, flat land base; it's quite mountainous. Swindle Island is quite mountainous and very treed, so it would be very difficult to build a large facility there, and you'd be running into extreme difficulties with your energy use.

When you think about Klemtu, they've gone from an 85% unemployment rate to one person in every family working in the industry. They run their own processing facility there. It's revitalized that entire community. Think about the capital cost to put a closed facility into that location. I think the very hard answer would be that the companies would need to offset that increased capital cost, even if you could find the land there, which you can't. You would move closer to market. You would have to offset that cost somehow, and that would be by reducing your transportation costs, for example.

It creates a number of challenges. We do see that there are opportunities with the technology, as Rob has described, and his technology is not what we would consider a true closed containment system because the facilities do have some exchange of seawater in and out, but I'm not going to speak to his facility. We look at a closed system as a completely closed system.

To be able to transition the industry to that, the large companies in British Columbia would simply move their investment elsewhere. That would be the reality of that kind of a situation.

● (1605)

Mrs. Patricia Davidson: One of the comments that I thought you made—I'd like you to elaborate on it and correct me if I misunderstood what you were saying. You were talking about the environmental concerns and harms that some of the other people that we've heard from have talked about, and you also went on to say that you felt they were presumptions only, and that there wasn't science to back them up.

Could you speak a bit further on that, please?

Ms. Mary Ellen Walling: It's been a very interesting experience participating in the Cohen commission. We were named in the terms of reference for Cohen, so we're one of only two groups that are funding our own participation in that committee, and it's been a very expensive and very time-consuming experience. But it's also allowed us the opportunity to review a great deal of the science that's been put toward the commission. We had three weeks of aquaculture hearings.

The Cohen commission contracted with four scientists, and we provided them with all of our fish health and sea lice data, dating back to 2002 on a farm-by-farm basis for 120 farms on the coast. The four researchers who reviewed that data concluded that the data were very robust and complete, there were no gaps in the data, and based on the data they reviewed, they could see no linkage between salmon farming, disease and sea lice, and the sockeye returns, either the low return or the high return. There was simply no basis to draw that linkage.

So when you look at environmental effects on wild salmon runs, there are a couple of areas you'd look at. You would look at disease interactions. You would look at sea lice interactions. You could look at escapes and interbreeding. I think the waste question is largely understood not to be an issue if farms are well situated and if feeding is well controlled, which it is.

So if you look at those three things, we're not seeing that we're having an effect with escapes. We keep the fish escapes down. We don't want the fish to escape. Atlantic salmon cannot interbreed with Pacific salmon. They're completely different species, so you're not going to see genetic dilution. On the coast of British Columbia, we've been trying to introduce Atlantic salmon since 1874. Millions of fish have been released through the 1930s, 1940s, 1950s. Most recently, in Oregon, there was a release of Atlantic salmon in 2010. They simply do not colonize. I think it was quite frustrating for those sports fishermen back in the 1930s who thought this would be a prized recreational fish. So escapes are really off the table.

Then you look at sea lice and disease. These are the kinds of things our veterinarians have complete control over. We make sure that the fish are going into the sea pens in very good health. We can document that, and it's audited. They don't have sea lice on them when they go into the sea pens. We monitor the fish very carefully. We don't see large, unexplained losses. We have a very good record of disease management, with a very low use of antibiotics. Less than 3% of the feed in British Columbia is medicated at any stage of a growth cycle. The issue of sea lice has been so overstated in the public domain that people fail to recognize that we have very low numbers of lice on our fish. We have a different species of louse than in the Atlantic Ocean; they're much less aggressive, and we're monitoring them very carefully throughout their life cycle.

Those are the kinds of things we do to protect the environment.

● (1610)

Mrs. Patricia Davidson: Thank you.

The Chair: Thank you very much, Ms. Davidson. Your time has expired.

Mr. Donnelly.

Mr. Fin Donnelly (New Westminster—Coquitlam, NDP): Thank you, Mr. Chair. I would like to thank our presenters as well for coming and providing testimony to the committee.

Mr. Walker, if I could start with you, I'll ask a couple of questions. Can you tell the committee why your company decided to make the move to closed containment?

Mr. Robert Walker: Sure. We actually were net cage farmers—we grew chinook salmon on the northwest coast of Vancouver Island for quite a few years—and ended up losing our farms because of several significant losses of fish due to uncontrolled plankton blooms in the area.

We wanted to stay in the salmon farming business, but we didn't want to keep losing fish, so we were looking around. At the same time, the B.C. government had a program that invited salmon farming companies to look at ways of.... There was a moratorium on new licences at the time, so the B.C. government said, “Okay, if you guys can show us some new methods to grow salmon that don't involve net cages, we'll give you some licences.”

So of course we jumped on that. We got involved with the Cedar facility, which was a pre-existing, land-based, flow-through system. It had eight tanks of 750 cubic metres apiece that we grew salmon in. We learned an awful lot from it, but we recognized that the economics were silly. It didn't make any sense—there were 175-horsepower engines to push water 40 feet ahead. It was just kind of an absurd situation, even though the fish did very, very well in the closed system.

We took what we learned from there and thought that maybe we could reduce the energy costs by putting it in water. So on paper we designed a system large enough to be commercially viable, with an energy footprint that was really limited. Once you're at the same level in the water, you're just moving water laterally, so your energy costs are really low. We went from a system that had eight tanks of 750 cubic metres to our current system now of one tank that's 3,000 cubic metres. We move water through there once an hour using two 15-horsepower motors, and we're running at about a third of their capacity—so we're using roughly 10- or 12-horsepower to move that much water through that system. That demonstrated to us that there were a lot of possibilities in closed systems in the water.

Mary Ellen pointed out that our system is a flow-through system, and that's true. We pump water from depth to go through the system. We take the solids out and put the rest of the water back into the ocean. It's not a true closed system, certainly not a RAS system—a recirculating aquaculture system—but I think it addresses so many of the current issues in farming that it's well worth looking at.

What's interesting, too, is that we also got involved in this industry from an environmental perspective. We wanted to protect our fish from external environmental issues, but it's also a farm management issue. We felt we could really reduce our overall costs if we kept our fish healthy and grew them at higher densities at a lower footprint. Certainly, on a modelling basis, we're equivalent to the current net cage industry costs. I think that's an important factor to think about.

Certainly, upfront capital costs are somewhat higher. We've moved in a very good direction regarding that: we've reduced our capital costs down—by about a third since we started this process—and we'll continue to do that as well. I think we have a very good system that will continue to improve—one I hope the industry considers.

Mr. Fin Donnelly: I just have a brief follow-up question.

How soon do you think you could move from pilot to commercial? Or do you plan to become competitive with your competitors on the west coast at the scale they operate on?

Mr. Robert Walker: Our licence right now at Middle Bay is for 1,200 tonnes a year; a typical salmon farm would be 2,500 tonnes or 3,000 tonnes a year.

The site has some limitations. We could put possibly as many as four more tanks on that one site, so I guess we'll be getting up into the commercial scale at that point—we're pretty much ready to jump into that. Because we're still fairly new at this, we are innovating on a daily basis, as it were. We're looking at all kinds of ways to improve the way we operate the system, but generally I think we are very close to commercialization. We've certainly had a lot of interest from the industry around the world, and we're in negotiations right now with a number of people to install trial systems as well.

● (1615)

Mr. Fin Donnelly: Thank you.

Mr. McKenzie, I just have a quick question for you.

You mentioned biological limitations to closed containment. I'm wondering if you feel there are biological limitations for open net systems as well. To be more specific, do you think we've reached those limitations on the west coast?

Dr. Peter McKenzie: The biological limitations that I was speaking to were the control systems that we put in and the research systems where we maximize temperature in order to maximize growth. There is a limitation in temperature profiles. Obviously, in open-net pen systems you don't have control over that, so you have a natural temperature control.

The other limitation was in the density issue, and open-net pen systems, again through stress mapping activities and research, have demonstrated that the densities that fish best survive in and best grow in are below the numbers I mentioned, 17 to 22 being the maximum, the optimum being around 10 kilos per cubic metre. That again is a density that we're not pushing the fish beyond. Again, in open-net pen systems that's a very feasible system. So as far as the parameters that I was speaking to, open-net pen systems are very sustainable.

Mr. Fin Donnelly: Thank you very much.

For the remaining time, I will ask my colleague to ask a quick last question.

Mr. Ryan Cleary (St. John's South—Mount Pearl, NDP): Thank you, Mr. Chair. I have a quick question for Ms. Walling.

Concerns have been raised on the east coast of Canada that cuts to the federal Department of Fisheries and Oceans and to Environment Canada will hinder the ability of regulators to manage and enforce existing regulations for open net aquaculture.

Cooke Aquaculture on the east coast was charged recently for alleged use of illegal pesticides. I'm looking for your opinion on that, Ms. Walling. Is there any truth to that, that cuts to DFO, cuts to Environment Canada, will take away from the ability to manage and enforce regulations?

Ms. Mary Ellen Walling: It's a good question, because of course we're now under a new regulatory regime. A fishing licence, actually, is what we have in British Columbia.

I think my colleague who grew salmon probably talked about the need for an aquaculture act. Aquaculture is mentioned once in federal legislation, and it's in the bank act. We are a bit challenged on the west coast because we're now regulated by the Department of Fisheries and Oceans and we have fishing licences. This is a bit challenging for the farm companies, to kind of wrap their heads around the idea of common property and property that we control from the egg to the plate.

The issue on the east coast, as I understand it from my discussions with colleagues there, is quite different. There's a mix of federal and provincial regulations, with the provinces taking the lead on much of the regulation of the industry, which was the scenario we had in British Columbia some time back.

I would say that the Department of Fisheries and Oceans is quite well-resourced for the west coast. I think they have 60 staff to manage our industry, which is a large number of staff, and then of course there are 13 or 14 fisheries officers specifically for aquaculture, both finfish and shellfish.

I would say that I'd like to see more money for research. Certainly, I think some directed money toward research would be wise, but I also would like to see an aquaculture act, because I think we could streamline and harmonize our regulations right across Canada and have a much better understanding of the business from a regulatory point of view.

The Chair: Thank you very much, Mr. Cleary.

Mr. Kamp.

Mr. Randy Kamp (Pitt Meadows—Maple Ridge—Mission, CPC): Thank you very much, Mr. Chair.

Thank you, Ms. Walling, Mr. Walker, and Dr. McKenzie, for appearing.

Let me just ask a quick question, Mary Ellen, if I could.

You said that you were a participant in the Cohen commission, and still are, I guess. All participants had to sign I think what was called an undertaking of confidentiality. What was that for, how did it relate to the flow of documents, and how did that come into play or not come into play in the recent claims regarding ISA?

● (1620)

Ms. Mary Ellen Walling: It's a bit of a sore point for me, I must say. As a participant in the hearings, you're granted standing. With that standing come some obligations and requirements. One of them is.... Because of the volume of information that's being put into this massive database, as the different hearings are scheduled, the documents are then extracted by the council and by the participants' council and by Cohen and commission staff. Then they're entered into evidence or not entered into evidence.

So it's a way to collect a lot of data and then use it in a proper and respectful way. We're all required to sign an undertaking. So for the Salmon Farmers Association, anyone who has looked at any of that information signs an undertaking. The undertaking says you will not release the information; you will not describe the information to anyone who isn't part of that process until it becomes evidence in the proper flow of time.

We have seen repeated breaches of the undertaking into the media for the entire time the Cohen commission has been going on. The most recent breach is this release of information on ISA. I think it broke in a Seattle newspaper.

It's extremely frustrating both for me and my colleagues in the business. We're starting to get a lot of questions from the marketplace. We're not able to discuss...even now that it's in the media. I asked my lawyer to tell me exactly what I should describe to you should this question come up. He said that any communication of information subject to the undertaking would be a breach, and a document leaked to the media does not release me from the undertaking. I'm having to answer questions from our customers without talking about what I can be talking about.

For the question of ISA, though, I will say that our farms have been tested for ISA over the past five, six years. Over 5,000 fish at this juncture have now been tested. We're showing no signs of this disease. We would be the canary in the coal mine here, because our fish, Atlantic salmon, are highly susceptible to ISA, whereas Pacific salmon are not.

So it's a big concern for us, and we hope this breach of undertaking doesn't continue. I don't have a lot of confidence about that at this point.

Mr. Randy Kamp: Thank you very much. That's interesting.

Mr. Walker, I've been to Middle Bay two or three times now and follow with interest the development of that. I'm not sure you told us about why you chose chinook salmon in this case rather than Atlantic or coho.

Mr. Robert Walker: Actually, we were chinook salmon farmers before, when we were in net cages. We had a lot of experience with them. We liked the fish and had lots of experience with it.

When we were at the Cedar facility, we grew Atlantics, coho, and chinook, and then opted for chinook salmon, both because we knew it and because our markets asked for it. We have discovered the retail markets really want Pacific indigenous species, so we're happy to oblige.

Mr. Randy Kamp: Will you get a premium for that chinook salmon that you wouldn't get with Atlantic salmon?

Mr. Robert Walker: Likely, yes. Premiums are ethereal. They don't last. We haven't done any business modelling based on premiums; we've just modelled on current commodity rates.

Mr. Randy Kamp: You're on the grid in Middle Bay. If there wasn't any place to plug in and you were out on some bay, how would you be able to operate? Could you do it in a cost-effective way?

Mr. Robert Walker: Cost effectively, we've actually looked at diesel generation. So from a cost perspective, it's certainly doable, but you're dealing with a pretty major carbon footprint if you choose to go that way. That's the sort of decision that would be made by an individual farmer. Certainly from a cost perspective, diesel generation does work.

Mr. Randy Kamp: Dr. McKenzie, I want to thank you for the information you gave us, and particularly for the comments you made about animal welfare issues, and so on.

You said there is documentation or studies to show optimal densities for fish health and welfare, and 17 to 22 kilograms per cubic metre, I think, was the number you used. Can you provide us with some studies or documentation, something we can understand, that gives us a bit more information on that?

● (1625)

Dr. Peter McKenzie: There are no specific studies that I can provide now off the top of my head, but certainly I would refer you to some of the standards I mentioned. The Royal Society for the Prevention of Cruelty to Animals and Compassion in World Farming both have standards that deal with fish farming. They reference a number of projects and where they've come to those numbers of 17 to 22. That's what they consider their maximum. They also deal with a large number of other welfare parameters that can be measured.

Mr. Randy Kamp: Mr. Walker, what do you think about that?

I'm assuming you're going to be above 17 to 22 kilos per cubic metre. What's your opinion on this?

Mr. Robert Walker: We modelled at a peak density of about 35 kilos per cubic metre. It's our experience that the fish have done very well.

Peter referred to cortisol earlier. We did some comparable stress tests from the facility at Cedar where we were growing them at 42 kilos per cubic metre and compared that to net cage farms. The scientist doing the work was not able to find any significant difference in cortisol levels between the fish in the Cedar facility and the net cages he was looking at. That's a piece of interest.

I also think that fish find their own densities. We observed the fish in our tanks moving both horizontally and vertically through the water column. They seemed to find their comfort zones. I believe that as long as we're providing the right amount of refreshed water and oxygen systems, they don't experience that much stress.

We've had a lot of comments on the fish condition in our system. They're a really robust fish. They look very healthy and behave very healthily. So far, I don't think that's an issue.

The Chair: Thank you very much.

Mr. MacAulay.

Hon. Lawrence MacAulay (Cardigan, Lib.): Thank you very much, Mr. Chairman.

I want to welcome Ms. Walling, Mr. Walker, and Dr. McKenzie.

Ms. Walling, you're funding your own participation in the Cohen commission. Is that to make sure that the proper story is related to the commission? Why are you involved like that? You're one of two groups that is paying to participate in this commission. Is that correct?

Ms. Mary Ellen Walling: Yes. We determined that we needed to be participants in it because we were named in the terms of reference as a possible cause.

We did not apply to the Canadian government for funding support to participate, but most of the other groups, except for ourselves and Rio Tinto, did. Their participation and legal fees are being paid by us, by Canadians.

We felt it was important for us to participate. We did not want the Canadian government and Canadians to pay our legal bills; this was a responsibility we had to undertake, but it's been very expensive.

Hon. Lawrence MacAulay: When you have problems, of course, the gag order is not so helpful either.

Ms. Mary Ellen Walling: It's not helpful.

Hon. Lawrence MacAulay: Dr. McKenzie, on the fish farms with the open net, when the fish are treated, we've heard a lot of different testimony around this table. Do you believe there's a problem when Slice or other treatments are used for fish in that it affects anything beyond the net, or do you think there's no problem at all in that area? Also, do you believe it affects what is beneath the nets?

We had a doctor here, I think in the last meeting, who indicated that the land was practically dead underneath the open-net concept. I'd like you to comment on that and whether you feel it is or isn't a problem.

● (1630)

Dr. Peter McKenzie: With regard to drugs, antibiotics, and/or sea lice, I will group them for this discussion into one: sea lice treatments. We use a number of strategies in order to minimize release of drugs into the environment. We use feeding strategies if and when we have to medicate, which as Mary Ellen has indicated is very rare. We focus on prevention so that we minimize the number of treatments, and in most cases the number of treatments on a farm in an entire production cycle is very small; maybe one or two is very common. That will occur over a five- to seven-day period. So this is a very small portion of the feed production throughout the entire production cycle of that farm.

During those production cycles, we also use as very low levels of drugs as we can that are effective. We also manipulate feed rates in order to minimize...so that there is no feed left that's going out into the system unconsumed. We focus very much on those. In addition to that, we've participated on projects over the years where we've looked at and tried to identify drugs in the environment, in the benthic, post treatments. We've had systems where we've had animals in sentinel cages beneath the system and looked for and tested for drug residues in those sentinel species, whether they be prawns or shellfish in the areas. We've never had a problem with that. When we've done those projects, the results have always been very positive as far as no detection of drug.

That gives me great comfort as a veterinarian that what I'm doing is not having an impact in that way. I believe the doctor you referred to, maybe Dr. Ikonomou, has done some research on Slice. We have been participating in that research project where he's been looking at trying to detect levels of Slice or sea lice treatment in spot prawns in and around farms. The detection limit he's getting is so sensitive that he feels he's been able to detect it at times during a treatment.

We're participating in activities such as that so that we continue to understand whether there is any impact.

Hon. Lawrence MacAulay: Thank you very much.

Therefore, in any studies you've been involved in, it has not affected the shellfish in the area around the open-net concept. Is that correct?

Dr. Peter McKenzie: That's correct.

Hon. Lawrence MacAulay: Thank you very much.

Mr. Walker, I suspect you're not in this for the good of your health. I think you want to make money.

I'd just like you to comment on what's taken place and how you feel about this. You've got a closed containment in the water. You take in the sea water. What difference is it to the closed containment that we've been hearing about here? This water is filtered as it comes in. Am I correct? All the sediment is taken out when it's released. Is that right?

Mr. Robert Walker: Almost. The latter part is correct.

We're actually pumping sea water from depth unfiltered, bringing it into our system. We exchange it with the tank about once an hour and then we collect the solid waste from it. We move the solid waste to land and then the rest of the water goes back into the ocean. It's a fairly simple system. It doesn't involve high technology, like a biofilter or ozonation and so on. That's why our energy costs are so low as well. We don't need to be using those systems.

Hon. Lawrence MacAulay: Thank you very much.

Also I'd like you to comment on.... Well, you haven't treated and you do not have to treat for sea lice in the closed containment that you have. Is that correct? You have no problem.

Mr. Robert Walker: That's correct. We haven't had any experience with sea lice at all. We're actually growing a Pacific salmon species, chinook salmon, that does not typically have an issue with sea lice infestation. We did have experience with Atlantic salmon in the Cedar facility, which was also a flow-through, although on land, and we had zero incidence of sea lice there.

I think we have quite a bit of work to do in that regard. I referenced in my comments that we actually have the ability to draw water from depth. Sea lice tend to thrive in the sort of upper trophic regions, near the surface, so if we're able to draw fresh water from roughly 15 or 20 metres below, then we avoid most of the sea lice populations. So transference and infection is really limited. We practice limitation, I guess, rather than treatment.

● (1635)

Hon. Lawrence MacAulay: Thank you very much.

The Chair: Thank you very much, Mr. MacAulay.

I'd like to take this opportunity to thank our guests for joining us today. We really appreciate the information you shared with us. It's been very helpful for this committee. Again, I want to say thanks for taking the time out of your busy schedules to appear before this committee.

We'll take a short break while we switch to our next witness.

Thank you.

● _____ (Pause) _____

●

The Chair: Members, we'll start our meeting.

I'd like to say thank you to Mr. Tyedmers for taking the time out of his schedule today to appear before our committee.

I know you have met with our committee before and are familiar with the proceedings of the committee. So that we can get in as many questions as possible, we try to constrain members to a timeframe for questions and answers. And we generally allow about 10 minutes for opening comments.

Mr. Tyedmers, any time you're ready, I'll let you proceed with your opening comments.

Dr. Peter Tyedmers (Associate Professor, School for Resource and Environmental Studies, Faculty of Management, Dalhousie University, As an Individual): Thank you very much.

Good afternoon, and thanks to all the members who are present for the invitation to appear before the committee again. I think it's been a year and a half since I first appeared, and that was in person.

My name is Peter Tyedmers, and I am an associate professor in the School for Resource and Environmental Studies at Dalhousie University. My research focuses on understanding the resource and environmental sustainability of food systems, in particular fisheries and aquaculture systems. In this context, I'm particularly interested in the role that technologies play in moving us away from or toward sustainability.

To offer a little more detail, I've been attempting to measure the energy and related impacts of how we fish for and farm salmon for something like 15 years. Consequently, I broadly understand why I've been invited to appear as a witness for a second time, but I will admit to being a bit unclear as to the details of how I might best serve the committee. So my opening comments are going to be brief and generalized so that we can try to leave as much time for questions as possible.

Before I get into any substance, I'd like to make a quick observation that I've had a chance to look at some of the recent testimony that others invited to appear as witnesses have made, and reflecting on some of their testimony it occurred to me that I'd like to think that I'm not here to sell you on any specific ideas. While I know that some in industry, some in government, and some in the NGO community might see me, being an academic, as somewhat partisan, I'd like to believe that, if you'll excuse the English phrase, “I have no dog in this fight”. I'd like to think that I'm interested in just the understanding of how we do things and not so much in promoting one side or another.

All ways that we produce food and provide jobs have resource and environmental impacts. Seafood systems have many, if substantial, advantages over many other types of animal food production systems. The challenge from my perspective is how we understand what these resource and environmental impacts are and how we end up accepting the trade-offs that our choices entail.

If we think about closed containment aquaculture, we know that these systems can take many forms. We can think of them as lining up over a sort of continuum on a spectrum, in terms of the extent to which we substitute technologies that require material and energy inputs for ecological services that would otherwise be provided—to a certain extent, we could imagine—for free, but nothing is ultimately free, that sustain salmon in culture.

What are we talking about here? Well, depending on the type of culture system, in the closed containment system we're dealing with we have pumps that have to move water. That may involve moving water up hill or maybe moving water around a culture environment. We often need to bring supplemental oxygen in to keep animals alive. In some cases we use other technologies to strip waste products and either recover these waste products or at least submit them to the broader environment. That could be CO_2, as a result of the respiration of these animals in culture. In a lot of closed containment environments we're dealing with very high densities of animal biomass, and if we don't remove the CO_2, these animals will get sick and die very quickly.

In many of these contexts we also have the opportunity to strip excreted wastes. These might be solid wastes, wastes that are in the water. Depending on how we want to design these systems, we want to recover these and treat them, take them on land and do something with them.

Importantly, all of this is typically underpinned by energy inputs. It's very hard to escape the secondary requirements for additional energy inputs when we start to add new technologies and substitute them for ecosystem goods and services. The research I've done with some of my students and colleagues in the past suggests that these energy inputs can be very large, depending on the extent to which we're substituting technologies for ecosystem services.

Very briefly—and I'm sure that some of you may have had a chance to look at some of the work we've published in the past—when we've compared real-world data from net pen systems to that from in-water bag systems on land-based tank farms sited in British Columbia and that from land-based Arctic char farms on fresh water here in Nova Scotia, we have found that if we exclude the energy associated with providing feed, the electricity required on the farm sites for bag systems that required pumping was 1.5 kilowatt hours per live-weight tonne of salmon produced.

● (1640)

In contrast, a tank farm sited in Cedar, British Columbia, required over 13 kilowatt hours per kilogram of live salmon produced. The Arctic char farm here in Nova Scotia, given all of its challenges in actually producing healthy fish with relatively low inputs, was requiring over 22 kilowatt hours of electricity per live-weight tonne of fish.

If we step back and think about the broader life-cycle, total energy requirements of these systems—and for a 2009 paper in British Columbia, we modelled a net pen system and included all of the inputs associated with small provisioning and feed production and provisioning, and all the things that go on within the farm—it takes about 27 megajoules per kilogram of live-weight salmon produced. At the other extreme, when we look at the land-based Arctic char farm on fresh water, which has a full recirculation system, it took over eight and a half times the total amount of energy required to produce those animals, per kilogram of animal produced.

Somewhat similarly, although on a smaller scale, if we look at greenhouse gas emissions—this also includes the life-cycle greenhouse gas emissions associated with all of the feed provisioning, which is a critical aspect of understanding these systems—for net pens it was about two kilograms of CO_2-equivalent greenhouse gases per kilogram of salmon produced in a net pen system. It was five times that level when we were looking at the Arctic char farm in Nova Scotia.

It's important to note that the work we've done in the past does not attempt to quantify local ecological benefits or costs of the systems we have characterized or attempt to quantify what might be possible if some of these systems worked more efficiently, through either better management or economies of scale, if those are possible, or the application of better, less resource-intensive technologies.

Essentially the work we have done in the past, and which I prefer to do, is to characterize systems based on their real-world performance. It's a critically important aspect. People engage in design and engineering to try to imagine what the next best technology is going to look like. We need this to happen. But if we assume that reality is going to mirror our theory and models perfectly, we are often in for a bit of a surprise.

The upshot is that while isolating salmon from the aquatic environment may provide benefits in terms of reducing local ecological interactions, that result is not guaranteed to occur in all closed containment technologies. It also means that many of the ecosystem services, whether we're talking about oxygen provisioning, waste assimilation, or maintenance of a reasonable temperature regime to keep animals alive, are diminished or lost when we substitute technologies underpinned by energy.

Let me be clear. I'm not saying that all closed containment technologies share in these challenges. If we think about the continuum of technologies that are available, at the extreme end we are basically rearing salmon in environments that are extremely far removed from what would naturally keep them alive. The only way we can do that is to provide a lot of energy inputs.

As I mentioned earlier, I've had a chance to review the testimony of some of your more recent witnesses that have appeared. While I would say I applaud their enthusiasm and optimism regarding the likely energy and associated greenhouse gas emissions for what they see as the proposed next generation of land-based closed containment technologies, I remain unconvinced regarding some of their projections. From my perspective, the numbers simply don't seem to make sense. They seem very optimistic. Again, ultimately, the proof has to be in the performance of these systems in the real world.

By comparing the energy and greenhouse gas emissions associated with different culture systems, as I think some of them have done, while excluding what is a central driver of energy costs to salmon culture and greenhouse gas emissions—by which I mean feed—they are greatly restricting what we can honestly say about the differences in these technologies at the back end.

● (1645)

So while it's important to make these comparisons, I think we have to be very guarded when we don't have real data on real performance. We're very limited in what we can say about the relative performance of two systems—net pens versus some sort of closed containment—if we choose to exclude what is in most cases one of the major drivers of impact, and that's feed.

I think that's still under 10 minutes, and I'd love to move to questions if that works for the committee.

The Chair: That's terrific. Thank you, Mr. Tyedmers.

Mr. Sopuck.

Mr. Robert Sopuck (Dauphin—Swan River—Marquette, CPC): That was a most interesting and informative presentation, Mr. Tyedmers. What I really liked about it is that you put numbers on everything. Ultimately these kinds of decisions must be made based on the numbers.

I come from a farming constituency in western Canada, but as I heard you present to us, many agricultural analogies sprang to mind.

Let's just take beef cattle ranching as a comparison. There are different types of beef cattle production. Can we say that net pen aquaculture in coastal waters is kind of like grass-fed beef in natural pastures and natural habitat, such as occurs in southwestern Saskatchewan, sort of a semi-wild kind of food production that is not that far removed from the natural world itself?

● (1650)

Dr. Peter Tyedmers: You've invited me to wade into some deep waters and talk about systems that I don't have direct expertise in modelling myself. But it turns out that actually in one of my courses just last week we were talking about this very subject, so I've had a chance to think about it a little bit. I was a bit prescient.

I wouldn't say they're analogous, because one of the major differences is that cattle on pasture are essentially foraging for themselves. It's basically a solar-powered food collection system. In contrast, in a net pen we've already moved them away from that. We've already substituted a bunch of technologies for their foraging behaviour. We're talking about tractors, fishing boats, processing plants, transport trucks, and barges that bring food to them.

The closer analogy might be between cattle in a full confinement feedlot sort of setting with fish in a net pen. But again, we're also talking about very different animals with different metabolic needs. Cattle are warm-blooded and need to burn a lot more fuel in terms of food to keep themselves alive than fish do. There are also very substantial differences in the basic biology, the fecundity of these two production systems. It's difficult to just isolate and talk about a cow standing alone in a field and a salmon alone in a net pen and try to make direct comparisons, because you really need to think of the whole system.

But to get back to your direct question, I would say these things—a cow in a pasture and a salmon in a net pen—are not very good analogies for each other from a technology perspective, because we're substituting technologies for foraging behaviour in the net pen.

Mr. Robert Sopuck: Right. I appreciate the distinction, and I think you're right on there.

But I think the agriculture-aquaculture analogy stands in many ways, because if we look back in human history, we started off as hunters and gatherers. As agriculture developed, our reliance on wild food diminished through the application of energy and labour, and we actually ended up in the situation we have now where we do not have to hunt wildlife to live. We've replaced it with agriculture.

Maybe I'll ask you to speculate. Perhaps this is not quite in your area of expertise, but it seems to me that with the world demand for seafood rising and the ability of wild fish to sustain that almost at its breaking point, economically sound and productive ocean aquaculture can substitute for the harvesting of wild fish, which is basically a form of hunting, and be a force for conservation of wild fish stocks.

Could you speculate on that?

Dr. Peter Tyedmers: I could, but it might be dangerous.

Voices: Oh, oh!

Mr. Robert Sopuck: Well, this is the business I am in, so....

Dr. Peter Tyedmers: Let me be more daring than might be prudent. I take your situation and I understand, because I've been wrestling with these questions for a long time.

Stepping away from salmon aquaculture to different ways of culturing different species and thinking more generally, absolutely aquaculture, writ large, right now plays a substantial role in providing extremely high-quality protein to humans. Over 50% of the seafood eaten globally right now is derived from aquaculture of one form or another.

But aquaculture is incredibly heterogeneous. Even within the culturing of salmonids, which is the focus of your committee right now, we see a huge range of different technologies, and we even see a huge range of different technologies that we can deploy in terms of catching salmon. In fishing for salmon, everything from trolling to purse seining has very different consequences.

I would never say that cultured salmon are a good substitute for wild, if we're talking about a pure substitution. For our wild stocks of salmon, particularly in the Pacific—Atlantic stocks of salmon are commercially extinct in most jurisdictions—we still have tremendously productive ecosystems, right from headwater streams all the way through to the ocean, that can sustain viable populations and feed people and sustain livelihoods for hundreds of years still, if we are careful in their management. The amazing thing about that is that these animals are foraging in veritable deserts in the ocean and returning biomass to us.

I'm sorry to wax slightly poetic here, which I shouldn't try to do. But if you were to sit back and try to design an animal that you could eat 50% of, that tastes delicious, that you just have to let do its own thing and it will leave your territory, go out across the North Pacific, forage, and return two to four years later and be really easy to catch, you would design an animal like a wild salmon.

● (1655)

Mr. Robert Sopuck: I think my time is up. Thank you so much for your really thoughtful answers.

The chairman is giving me the high sign. I'm sorry.

The Chair: Thank you very much.

Mr. Donnelly.

Mr. Fin Donnelly: Thank you, Mr. Chair.

Welcome, Dr. Tyedmers. I have a couple of questions for you.

If you're using the life-cycle analysis or full-cost accounting, which system of fishing would you say is the most sustainable? I would just throw out three options for you: the wild commercial fishery; open-net aquaculture; and closed containment, for which I would specifically suggest the RAS, or the recirculating aquaculture system.

Dr. Peter Tyedmers: Life-cycle assessment is not necessarily the same as full-cost accounting, and none of these tools is perfect. None of them is able to account for all of the things that we value. For example, life-cycle assessment is very good as an accounting tool to help us understand material and energy demands of the system and how those can contribute to a suite of, let's say, broad-scale environmental impacts like ozone depletion or greenhouse gas emissions. But that being said, if you're asking me which of those three ways of producing salmon has the lowest life-cycle energy demands and associated greenhouse gas emissions, generally speaking, some forms of fishery-based capture, particularly using gears like purse seine, but far less so if you're dealing with trolling.... Trolling burns, relatively speaking, 10 times the amount of fuel that purse seining does. But generally if you want a spectrum, life-cycle energy inputs and greenhouse emissions and associated other impacts are quite low when you have very abundant stocks and you're fishing them using gears like purse seining and net pen aquaculture. From data that currently exist, life-cycle impacts would be the highest for recirculating aquaculture systems per tonne or kilo of salmon that is produced.

I know that others out there would probably disagree with me about placing the recirculating aquaculture at the other extreme, but from the data we've modelled on real systems, that's the case.

Mr. Fin Donnelly: Thank you.

I guess the emphasis was, in your opinion, on what was the most sustainable and on using either of those two systems to account for that. You're talking about a form of wild commercial fishery.

Secondly, if you took that—and you can elaborate a little bit on that if you want—what do you think DFO should be doing to better manage either the wild fishery or aquaculture?

Dr. Peter Tyedmers: Well....

Mr. Fin Donnelly: You have 30 seconds to answer that.

● (1700)

Dr. Peter Tyedmers: It's late in the day and I'm just not very well prepared to field that question.

The challenges DFO faces are really substantial on both of these fronts. For me to suggest which one approach would help move the game forward would be beyond heroic.

Mr. Fin Donnelly: So you don't want to hazard a guess or wade into that one.

Part of what this committee is looking at is how we manage the fishery, how we do that most sustainably, how we do that with the fewest impacts to the wild fishery, and how we consider aquaculture.

I have lots of time?

I'd like to turn it over to my colleague to ask a question, Dr. Tyedmers.

[*Translation*]

Ms. Rosane Doré Lefebvre (Alfred-Pellan, NDP): Thank you, Mr. Chair, and thank you, Mr. Donnelly.

Thank you to you, Dr. Tyedmers.

Your position on the subject is really interesting. You talked a lot about environmental impacts. We've heard several other witnesses talk to us about the effects on the environment of both closed containment aquaculture and net cage aquaculture. From the various testimonies heard, we gather that there are consequences for the environment.

My question is about the environmental impacts noted when net cage aquaculture is used. In your opinion, to what extent does this type of aquaculture affect the marine ecosystems, not only with regard for example to salmon, but also all species living together in our oceans?

[*English*]

Dr. Peter Tyedmers: I'm not a biologist. I don't actively study the approximate ecological impacts of net pen systems. The other challenge is, to be frank, that when you ask which is the most important or has the greatest impact, that is always, to a certain extent, in the eye of the beholder. I will provide you an answer, but my answer is going to be informed by my understanding of other people's work and my own values.

For net pen related work, from my perspective, the greatest chronic ecological effects would be those with benthic impacts, as well as in-shore impacts of waste accumulation in poorly sited settings. If we're taking impacts on salmonids off the table, in terms of sea lice and other negative interactions through disease transmission, I would probably say some of the more interesting and challenging approximate impacts associated with poorly sited farms and the benthic impacts associated with those. Again, those are impacts that can be remediated with time. If you fallow a site, my understanding is that in many instances within five years you can have a great deal of recovery in a lot of cases. Of course, depending on the locale and the setting, there can be big issues of negative predator interactions—seals and sea lions drowning in nets—but from my understanding, those tend to be relatively episodic. No one wants seals and sea lions drowning in nets. These situations are potentially avoidable.

I'm not sure if this helps.

The Chair: Thank you.

Mr. Allen.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you very much, Mr. Chair.

Thank you, Mr. Tyedmers, for being here with us today.

There's an old adage that when you're marketing things, location matters. For some of the work you do, there are tremendous differences across Canada in how our energy needs are actually met. In eastern Canada, as you're aware, we get a lot of our power from fossil fuels and that type of thing.

Based on your assessment, if we went to a situation of closed containment on land, would that benefit one region over another in terms of the long-term viability of the industry, unless, for example, all our carbon technology and energy-generating technology was changed?

● (1705)

Dr. Peter Tyedmers: It's a really great question, because something that surprised me when we first did this work was realizing how important the setting of a technology can be given exactly what you've identified.

Are there some regions with clear advantages? If the issues we're concerned about are those associated with fossil fuel combustion—greenhouse gas emissions, acid rain-generating emissions, or ozone-depleting emissions—then absolutely, you're better off siting these sorts of land-based systems in places like British Columbia, Quebec, and even Manitoba, where you have very high levels of non-fossil fuel-derived electricity to help power the technologies to keep animals alive.

If you're concerned that your environmental impact is, however, on wild salmon in rivers, then you may want to avoid hydroelectric generating. Hydroelectricity also comes at costs. Geography matters. Setting matters, absolutely, but we shouldn't ever lose sight that we're probably always making trade-offs when we choose a setting where electricity is derived from different primary resources.

Mr. Mike Allen: In your thinking, have you taken into account the value of land? We know that moving this footprint onto land would take several hundred acres. From your analysis, would anything suggest that would be a problem? Do we have siting possibilities, and what would the economic value of that land be?

Dr. Peter Tyedmers: I haven't done that sort of study. I haven't been asked to look at either the siting challenges, and all of the location constraints that would have to go into it, or the economics of actually trying to purchase that land. Something I have talked about, however, with one of my PhD students and actually co-author, Nathan Ayer—we were talking about this earlier today—is that there is also a permanence in the land change. I think that is worth thinking about when you're implementing a land-based recirculating aquaculture system.

We end up digging holes and pouring a lot of concrete. That technology, we hope, is going to remain in place for 20 or 25 years, and if we choose to go down this path, it's going to be kicking out salmon at low inputs and low cost with low impacts. I think that has yet to be demonstrated, but at the end of that process you're going to have a site with a lot of concrete and steel. It's going to have been transformed. It's going to be a one-way transformation of hundreds of hectares or hundreds of acres, depending on how large a system you want to move to. I don't know if anyone's ever been concerned about that.

It's not addressing the issue of upfront cost, but it does represent a relatively irreversible change in that land use from forested land, agricultural land, or whatever it was to begin with. Maybe it was brownfields. Maybe it was previously industrialized and we're just repurposing it, but it does potentially represent a one-way transformation of land use.

Mr. Mike Allen: Thank you.

When you talked about some of the comparative analysis on char, I think you indicated that the char could take the 60 to 70 kilograms per cubic metre density, but that Atlantic salmon don't react so well to those kinds of densities. We just heard testimony from our last witness that would suggest that maybe 22 kilograms per cubic metre would be more than sufficient in a closed containment system.

Have you done any looking? Certainly the Freshwater Institute in Virginia has been doing some work and apparently has started to generate some data. Has there been any thought or have you done any work to update from a char to an Atlantic salmon comparison for the numbers?

Dr. Peter Tyedmers: All of my work is really derived from other people's data. Those folks who are in the field—either at the Freshwater Institute or in other settings—actually have the experience, as to how many fish you can keep alive in a cubic metre of water and how to actually grow them in healthy conditions. Unfortunately, I don't have any direct knowledge of that. Ultimately, my impression is that we can push animals pretty hard into higher densities. It just raises the stakes, in terms of the vulnerability of systems to power outages and to failures of systems.

I don't know how comfortable different strains of Atlantic salmon might be at very high densities, but basic biological principles would suggest that at higher densities your system is going to be more vulnerable to minor interruptions. If the electricity goes off and your backup generator doesn't kick on, and you've got 70 kilos of biomass in the water as opposed to 20 kilos of biomass, you're going to have a problem faster.

● (1710)

Mr. Mike Allen: Okay. I'll just ask a last question really quickly, Chair.

Have you received any data or talked to any folks at the Freshwater Institute with respect to their operation down there, as to how that might affect benchmarks or help you do any benchmarking to update your study?

Dr. Peter Tyedmers: I haven't yet. I'm working with a student right now, looking at doing some more aquaculture technology studies. We're actually focused, in the short term, on potentially looking at AgriMarine's marine-based solid-wall system—actually, I was speaking with the folks at AgriMarine yesterday—and I haven't had the occasion yet to reconsider a land-based recirculating technology. Of course I'd love to. It always depends on certain questions: What's the purpose? Where's the opportunity? Are there resources to bring to bear? Are there good students who I can let loose on the project?

Mr. Mike Allen: Thank you very much.

The Chair: Thank you very much.

Mr. MacAulay.

Hon. Lawrence MacAulay: Thank you very much, Mr. Chairman.

And welcome, Professor.

In your studies, do you find that the open net salmon farms are in the wrong place? Is that one of the problems, and should they be shifted?

Do you think more regulations need to be imposed by DFO on the open-net concept?

I'll leave you with that for now.

Dr. Peter Tyedmers: I apologize. It's really hard for me to provide any definitive answer to that, because I think there is so much heterogeneity in every site. Almost anybody could probably go and identify some poorly sited net pen sites. I'm sure the companies that manage and run these sites have sites they'd just as soon not be using—I could be wrong on that. It wouldn't surprise me that anybody could probably point to a site or two now.

That's not my area of research: looking at the specific qualities of sites, in terms of the demands we're placing on them with regard to culturing salmon. So, unfortunately, I don't have a good, definitive answer for you, except in generalities to say I'm sure there are sites that probably would be better off not having a salmon farm on them.

Hon. Lawrence MacAulay: I appreciate that, and apologize for not having....

On eco-certification, you talk about density in the closed containment, or even in the open-net concept. Do you see eco-certification being involved down the road in the sale of these fish? In my opinion, eco-certification is going to impose more restrictions on what takes place in the fishing industry than probably the Government of Canada will impose, because if they wish to sell the product, it would have to be certified.

Also, do you believe that fish farming should be under the authority of DFO or Agriculture Canada?

Dr. Peter Tyedmers: Wow. Those are two very different questions.

On eco-certification.... I'm sorry, was your question whether I would expect closed containment farmed salmon to be eco-certified, and is that a good thing?

Hon. Lawrence MacAulay: Yes. Are there enough rules in the open-net concept in order to make...? Are there rules on density? Do you expect there will be rules on density? Do you think this will have an effect on the sale of the fish? If countries around the world, when eco-certification—of course, you know what eco-certification is. If they decide it's not going to be certified, then you do not sell the product. That's where I'm going. Do you see that playing a role?

● (1715)

Dr. Peter Tyedmers: Absolutely, it does already. AgriMarine, which used to operate the land-based tank farm at Cedar before they moved away from the technology because it was just too expensive to run, were marketing a farmed salmon as “eco” salmon in local stores.

Right now there are land-based farmed salmon—I think coho—coming out of a farm site in Washington State that are a “best choice” in sort of the SeaChoice and the Monterey Bay Aquarium Seafood Watch program.

Eco-certification is here. It's not going to go away. Is it a good thing? I think it is, absolutely. If people want to choose products that are differentiated from other products that they see as problematic, I think people should have that opportunity to vote with their wallets and buy something. If it costs more and they're happy to pay more, they should be able to do that.

Hon. Lawrence MacAulay: People will pay more for organic products, so they'll pay more for eco-certified fish.

Dr. Peter Tyedmers: Some people will but not everyone. But, absolutely, if there's a market for it and people are willing to invest the serious time and energy into developing these standards and actually applying these standards, and then if farms actually make the change to pursue those opportunities, I think all of that is a good thing. Of course, it's always going to evolve.

On your second question, which was related to—

Hon. Lawrence MacAulay: It was on who should be in charge, whether DFO or—

Dr. Peter Tyedmers: Again, that's deep water. I would have to say it's really up to the federal government to determine who is best placed to execute its mandate with respect to the protection of aquatic ecosystems, fisheries, and fish.

Clearly DFO has been challenged throughout its history as an organization. Within the wild-capture fishery there are almost dual mandates to protect wild fish and ecosystems and at the same time fisheries, the things that humans derive. They've struggled with this dual mandate for a long time.

I don't see why we need to take it away from them now on the aquaculture front. But who am I to say?

Hon. Lawrence MacAulay: Thank you very much.

The Chair: Professor Tyedmers, I want to take this opportunity to thank you on behalf of the committee for taking the time today to meet with us and to answer our questions and provide us with a lot of information. It's greatly appreciated.

Committee members, we will move into committee business at this point in time. I believe we have a couple of items we want to discuss. I believe you all have a copy of the adjusted budget based on our conversation the other day.

Mr. Donnelly.

Mr. Fin Donnelly: Mr. Chair, I just want to make a general comment about the witnesses we just had, in terms of the cluster of presentations.

We had three witnesses in the first hour and one witness in the second. I was hoping for something like two and two. I'm sure there was a rationale for the clumping, but it was difficult to ask questions. We had three very good presentations. I'm not taking away from any of the presentations, but perhaps two and two, or something like that in the future, rather than three and one would allow a little more time to ask questions of the witnesses. Maybe in the future there could be that consideration.

The Chair: It's noted.

Turning back to the budget, you all have a copy of the budget in front of you. It's been adjusted as per the conversation we had at our previous meeting.

Are there any questions, comments, or concerns with that?

Mr. Allen.

Mr. Mike Allen: I have just a quick question, Chair.

Maybe the clerk could answer this. The price listed for the full-fare economy is $3,000 per person return? That seems like a lot.

If we're trying to make sure we get enough buffer, that seems like a lot of buffer.

● (1720)

The Chair: Let me see if I have this right.

Mr. Mike Allen: I anxiously await your explanation, Chair.

The Chair: As members of Parliament, when we book flights, we book the full fare and that gives us the flexibility to change flights, so if something comes up and we're not able to make it on that trip, we can change and we don't lose the full value of that flight. If you look underneath that, you'll see that the staff are at the reduced fare economy class, because if they do, they don't have the option of not following through on that.

That's the difference.

When we book a full-fare flight, obviously it's at a higher price.

Mr. Mike Allen: I'm just saying that with the full fare, it's almost like flying out of Fredericton, Mr. Chair.

The Chair: Yes.

Mr. Mike Allen: It's almost as bad.

The Chair: I agree. Or it's like flying to B.C.

For members of Parliament, it has to be the full fare.

Mr. MacAulay, you have a question?

Hon. Lawrence MacAulay: I've tried to save us some money over the years on that, and if you have to touch the ticket, you just can't do it. That's what you have to do, because if anything happens, you lose it.

The Chair: Yes, thank you.

Mr. Kamp.

Mr. Randy Kamp: The budget is indicating that a hotel room is $350 per night in Washington.

The Chair: Yes. The difference there, from the last budget, is that in the last budget that was before you here on Tuesday, it was $200 a night, and we've adjusted the number of nights, obviously, from one night to two nights as per the request. But the reason for the difference in the unit price is that the other was outside of Washington. This is downtown Washington, and that's why there is the difference in the unit price.

Downtown Washington has a premium rate, to be very frank.

Mr. Randy Kamp: It's pretty pricey.

I guess my suggestion would be that we go to the Liaison Committee with this, but if it's looking as though the committee has an appetite for a 20% reduction, then we take away the one night and we make it work as best we can and do it for $50,000 instead of $62,000.

The Chair: That is the thing, too, Mr. Kamp. We would go, and the budget would be no more than the amount requested. Obviously, if we can reduce that cost within that number, we will, but it would be no more than this amount that's requested.

Mr. Randy Kamp: I guess I would prefer to offer up the other night rather than having a reduction in the number of people on the committee. That's our first offer.

The Chair: I appreciate that. Thank you.

Mr. Allen.

Mr. Mike Allen: Considering the discussion, I move the adoption of the budget.

The Chair: If there are no further questions, Mr. Allen has moved this budget. We have an official motion, and I'm going to attach your name to it, so I'm hoping you'll move it:

> That for the study on Closed Containment Salmon Aquaculture, the Committee travel to Shepherdstown, West Virginia and Washington, D.C.

That's been moved by Mr. Allen.

(Motion agreed to)

The Chair: I have a second motion I would like to ask someone to move.

> That, in relation to the study on Closed Containment Salmon Aquaculture, the proposed travel budget in the amount of $62,559.60 be adopted and that the Chair present the said budget to the Subcommittee on Budgets of the Liaison Committee.

Do I have a mover for that?

It's moved by Mr. MacAulay.

(Motion agreed to)

The Chair: The other item we have to discuss today before you take off was on the motion brought forward by Mr. Donnelly at our previous meeting. We asked the clerk to contact the minister's office to check into the availability of the minister. The minister's office has replied that the minister would not be available before December 6. He's offered up his staff to come and appear before the committee.

I didn't ask the clerk to book it until I checked with the committee to see if that would meet with the approval of the committee. If that is the case, obviously we have one meeting left, on December 6, to be able to have that discussion with staff if that's the desire of the committee.

Are there any thoughts?

Mr. Kamp.

Mr. Randy Kamp: Yes. I don't oppose that, but I would just like to note that with the last supply day being Monday, as was announced today, then the supplementary estimates (B) are deemed reported as of today, I think, or Friday at the latest. I never get it quite right.

Obviously we could talk to the officials about supplementary estimates, but we can't report any changes or do anything with that.

We did pass that motion, so I guess it's the will of the committee at this point, but we might want to consider whether that would be the best use of our time to do that or whether we should continue on with more witnesses on the aquaculture study.

● (1725)

The Chair: Are there any other thoughts or comments?

Mr. Donnelly.

Mr. Fin Donnelly: Mr. Chair, could we hear who we have lined up for the 6th?

The Chair: We have the Pattison Group supermarkets, SeaChoice, and Albion Fisheries.

Albion Fisheries is lined up for the second hour; the Pattison Group supermarkets and SeaChoice are lined up for the first hour.

We'll have Kelly Roebuck from SeaChoice; Blendle Scott and Betty Beukema; and Guy Dean from Albion Fisheries. That is what we have scheduled for Tuesday.

So it's up to the committee. Would you like to invite staff to come on Tuesday, or would you prefer to stick with the original plan and seek the minister at a later date?

Mr. Fin Donnelly: In light of that, given the timeframe and the input we'd have after the fact, I think we should move forward with the original as planned. We were hoping to have the minister in to meet with the committee, but perhaps there'll be another opportunity to bring the minister in and ask the minister a few questions.

The Chair: Are there any other thoughts?

Mr. Allen.

Mr. Mike Allen: It's just a really quick point that I'll throw out to the committee; we can talk about it later.

We're getting to a point now where maybe, before the break, we would want to allocate a meeting during that last week, just to consider some thoughts on a preliminary drafting of a report and some ideas for the break time. I'm concerned with Kristen being busy.

I'm not sure where we're going to be, so maybe we can think about how much longer we want to go with witnesses and who we think might be applicable for the rest of the time.

The Chair: Thank you.

Mr. MacAulay.

Hon. Lawrence MacAulay: It would just be my guess, but I think if we're going to have that meeting, we need to have it soon.

Are we going to be here the following week? It's very questionable, but we want the meeting.

The Chair: On the calendar, we're scheduled to go until December 16.

As we all know, some things do change in time, but I think we are safe to say that we'll be here next week and part of the following week. We can schedule a meeting, if the committee desires to have that discussion.

For one hour.... We could plan that meeting for December 13. Does that make sense?

Mr. Donnelly.

Mr. Fin Donnelly: Just to clarify, are we talking about the subcommittee getting together or the entire committee?

Mr. Mike Allen: I was thinking maybe that's a discussion for the entire committee: to put some thoughts down as to where we are; what the general thoughts are on the direction of the drafting of the report—because that's helpful for Kristen as well—and any thoughts we have as to where we are at that point; and additional witnesses we think we might want to tap into, to schedule for after the break.

The Chair: All right. I appreciate the advice from the members.

There being no further business, this meeting is adjourned.

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