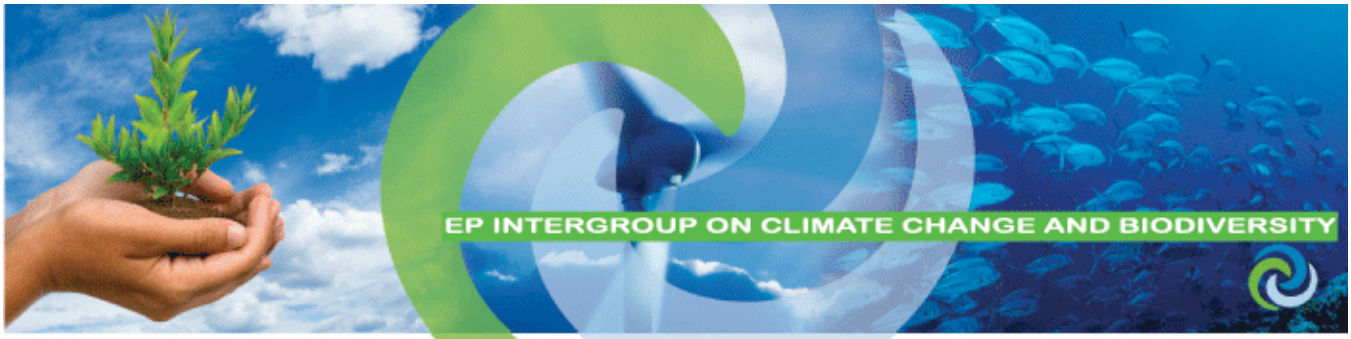

SEMINAR

Report from the Secretariat of
the Intergroup "Climate Change, Biodiversity and Sustainable Development"

"Can a growing aquaculture industry continue to use fishmeal and fish oil in feeds and remain sustainable?"

European Parliament, Brussels
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Chairman: MEP Pat the Cope Gallagher, Chair of the subgroup "Fisheries and Aquaculture" of the Intergroup "Climate Change, Biodiversity and Sustainable Development"

1. Introduction

MEP Struan Stevenson, Chair of the Intergroup "Climate Change, Biodiversity and Sustainable Development"

Mr Stevenson recalled that the Intergroup was the biggest one in the European Parliament (EP) with 200 Members. It includes a variety of subgroups, one of the most important is the subgroup on "Fisheries and Aquaculture", chaired by Mr Gallagher. The hearing on EU aquaculture held recently by the EP Fisheries Committee provided some answers for the own-initiative report on "*A new impetus for the Strategy for the Sustainable Development of European Aquaculture*", for which Mr Milana is the Rapporteur.

Owing to their unparalleled nutritional properties, fishmeal and fish oil represent a vital part of the diets of farmed fish. This is the reason why alternatives could not completely replace fishmeal and fish oil. "The advantages of feeding fishmeal and fish oil to farm animals have been known for around two thousand years", Mr Stevenson added. Furthermore, using fishmeal and fish oil ensures that the finished food products are healthy for the consumers.

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On the economic side, the fishmeal and fish oil industry provides over 30 000 jobs across the EU. Mr Stevenson criticised those who argued that fishmeal and fish oil from Peru, the biggest producer in the world, was not sustainable. To underpin this, he gave the example of the Association of Peruvian Anchovy Fishermen, which is currently seeking a Marine Stewardship Council Sustainable fishery ecolabel.
The European Parliament is exploring ways of putting an end to the problem of the wasteful discarding of healthy fish at sea. "We have an ideal opportunity here to use immature or out of quota fish for processing it into fishmeal and fish oil, thus avoiding the horrendous waste and environmental pollution involved in their wanton dumping overboard", argued Mr Stevenson.

2. Presentations

- Setting the scene
  MEP Guido Milana, Member of the Intergroup "Climate Change, Biodiversity and Sustainable Development", Rapporteur for the own-initiative report on "A new impetus for the Strategy for the Sustainable Development of European Aquaculture"

The European aquaculture industry has grown very little - approximately 1% - over the last few years compared to aquaculture globally: between 7% and 8%. We therefore need to reflect on how we can shape a new strategy for the future of the sector.

Fish are primarily designed to feed the human population, Mr Milana said. He explained that we should examine the environmental impact of aquaculture and see whether this activity is compatible with the conservation of natural resources. Establishing the conditions leading to a sustainable development of the aquaculture sector is of paramount importance.

Mr Milana raised the question of product quality. He referred to the research programs aiming to find alternatives to marine ingredients. Although he voiced his support for these alternatives, Mr Milana warned that the final products should have similar properties, thus maintaining the same quality. In his view, this is a prerequisite to be competitive on the market.

Mr Milana emphasised the need to involve all stakeholders in the ongoing debate. He listened carefully to the discussion which will contribute significantly to his own-initiative report. In the wake of the seminar, he encouraged participants to provide written suggestions to be fed into the report.

- Feed for aquaculture in relation to fisheries
  Jean-Claude Cueff, European Commission

Mr Cueff underscored the close linkages between aquaculture and fishing. Sustainability implies development of an activity without over-exploitation of natural resources. The overall question is as follows: how can we ensure that aquaculture replies to the growing worldwide demand while not jeopardising natural resources?

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Mr Cueff mentioned that aquaculture and fisheries were in some cases very much interdependent and that this interdependence was always linked to the food chain. He gave the example of juveniles of salmonids released in the wild for their feeding migration and coming to rivers for spawning at a time they were caught back. He also gave the example of juveniles of bluefin tuna caught at sea or glass-eels caught in estuaries and put in aquaculture facilities to be fattened before being put on the market Feed for aquaculture is first about conserving and managing marine fisheries resources, he argued. In other words, sustainability of aquaculture means sustainability of fisheries resources. It is of our duty to manage properly natural resources.

Mr Cueff also mentioned importance of research aiming at finding alternatives to fish meal and fish oil in feed for aquaculture**.**

Commenting on Mr Stevenson's proposal consisting of using immature or out of quota fish for processing it into fishmeal and fish oil, Mr Cueff recalled that the European Commission acknowledged that discards represented a major problem to be addressed in fisheries management. However, he expressed the views that it seemed more appropriate to concentrate first on efforts towards reducing and eliminating "unwanted catches" rather than using them in animal feed.

He concluded by referring to the "energy transformation chain" in aquaculture and the advantages and interests to have it the shortest possible.

- The question of fishmeal and fish oil: an FAO perspective
  Grimur Valdimarsson, FAO

By 2050 food production will have to rise by 70% to cope with the 40% increase in world population. As part of food production, fisheries will help to meet this goal.

Mr Valdimarsson provided answers to the three following questions:

1. Is fishmeal production a rational use of wild fish stocks? "We are not getting more fish from wild fish resources", he said. The state of fisheries stocks is worrying. Over 50% of wild fish are fully fished. The predictions of Mr Huxley in 1884, a highly respected biologist, saying that fisheries stocks are inexhaustible and considering any regulations as useless, are far from today's reality. Every two years, the FAO carries out a survey on the fisheries management measures put in place by each country. They reveal that 1/3 of the countries which have replied do not intend to perform actions to manage fisheries. Equally worrying is to see that countries, which have adopted measures, have chosen the wrong methods, thus yielding unsatisfactory results. In response to this situation, FAO drew up the Code of conduct for responsible fisheries which lays down how fisheries should be managed. Although the Code does not explicitly mention fishmeal and fish oil, one of the guidelines relates to fish utilisation. It spells out that fish are both a direct contributor to human diets and a raw material for animal feed. More precisely, fishmeal represents 1/3 of animal feed products.
   The reply to this first question is "yes" if fishmeal results from resources managed sustainably with possible consequences on ecosystems being assessed and addressed.

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2. Does it make economic sense to transform wild fish resources into feed fish? The market will determine the answer to this question.

3. Does it make biological sense to transform wild fish resources into feed fish? Biological sense refers to biological sustainability, Mr Valdimarsson said. The reply is "yes" if fisheries and aquaculture systems use best practices and precautions.

Dr Valdimarsson drew the following conclusions:

- Fish are limited resources
- Access to fisheries resources should be effectively restricted
- Micromanagement has been ineffective in managing fisheries
- Fishing rights should be set by involving the sector in the decision making process
- Competitive fishing arrangements should be avoided because they are wasteful and lead to operators giving little information about their activities

▪ Overview of the state of the main global feed fisheries

Blake Lee-Harwood, Sustainable fisheries partnership

"Most reduction fisheries are managed within acceptable limits", said Mr Lee-Harwood. The concept of "acceptable limits" has a commercial sense, meaning that commercial fisheries operating now would consider it as acceptable. It does not necessarily mean that it is sustainable and acceptable to all stakeholders.
As far as global sources are concerned, more than 50% of the total catch of fisheries used for reduction purposes comes currently from the South American Southeast Pacific. It was also noted that the West Atlantic contributes only 5% and the Northeast Atlantic over 25% of the total catch. It is worth stressing that these figures do not include trash fish used in mixed species in Asia to supply the shrimp industry. If this element had been included, it would have changed the figures considerably.

With regard to biomass level, only one of the top ten fisheries (by weight of production) used for reduction purposes is currently below the biomass limit reference point.

Mr Lee-Harwood deplored the lack of information on Chinese catches which results in misleading figures.

The 2007 draft calculation made by Sustainable Fisheries Partnership enabled them to judge feed fisheries using 5 criteria:

- Whether the management is precautionary
- Whether managers follow scientific advice
- Whether the fishers comply with that advice
- Health of the stock based on the biomass
- Likely stock health in the future

Based upon these criteria and available methodologies, each feed fishery has a score ranging from 1 to 10. Some of them do not meet all the criteria, such as the Chilean jack mackerel or the Japanese anchovy.

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Mr Lee-Harwood recalled the concern expressed by NGOs regarding the non-use of ecosystem-based methodologies for fisheries management by the world's major reduction fisheries. This concern is due to the key role of small pelagic species in supporting marine eco-systems.
One of the examples of management approaches to address ecosystem concerns is the protection of habitats of importance to fisheries and other marine life. This can be handled by excluding bottom trawling from certain parts of the fishery.

It was noted that trash fish are mixed species fisheries conducted on an informal or semi legal basis in Asia to supply shrimps. In addition, they are very poorly documented and have detrimental ecological impact.

Mr Lee-Harwood criticised the lack of transparency from producers who are unwilling to state the amount of fish they get. The same goes for retailers and processors. Urgent actions have to be adopted to put an end to this situation.

- Growth of global aquaculture and the feed ingredients available
  Albert Tacon, Aquatic Farms Ltd

Aquaculture has been increasing by 8.4% per year over the last 50 years while capture fisheries have remained stable since 1989. “Can the aquaculture sector keep growing in the future?” asked Dr Tacon.
We have over 65.2 million tonnes of aquaculture products valued at US $ 94.5 billion. The ones we have to feed are crustaceans and finfish. The fed aqua species have been increasing by 10.6% per year since 1980. If we want that sector to grow in the future, this growth has to be based on the ingredients that can increase with the sector. An important factor to keep in mind is that 80% of the fish we produce is fresh water fish.
Is this growth sustainable? We have to compare the 10.6% growth per year fed aqua species with the 2.5% growth per year for fed terrestrial livestock species. Dr Tacon underlined that both sectors want to keep growing in the future.

It was mentioned that China is the top fed fish and crustacean country. Of likely importance is that 93% of aquaculture production is produced by developing countries.

Dr Tacon pointed out that global production of commercial aquaculture feeds by major species grouping in 2007 amounted to 27.1 million tonnes. Aquafeeds use different dietary nutrient sources such as cereals, land animal protein meals and fats, aquatic animal protein meals and lipids etc. “All of them are necessary and we need nutrients which can grow with the sector”, he said.

As far as land animal by-product meals and fats are concerned, they represent the largest source of feed grade animal protein & lipid available to the feed industry.

Dr Tacon added that global demand for raw crop material is increasing due to the growth of the population.

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Finally, Dr Tacon argued that a growing aquaculture industry can continue to use fishmeal and fish oil in feeds and remain sustainable "if the aquaculture feed manufacturing sector is able to freely use all nutritionally sound & safe feed-grade ingredient sources available in the market place".

- Changing use of marine ingredients in feeds for terrestrial and aquatic animals
  Jonathan Shepherd, International fishmeal and fish oil organisation

Mr Shepherd recalled that Peru is by far the largest feed fishery. He emphasized the fact that the use of wild fish for fishmeal production is based on little effective demand for human consumption. It would be totally illogical not to use fish for human consumption when possible, he said.

On the supply side, global fishmeal and fish oil production is at around 5 million and 1 million tonnes *per annum* respectively. It has gone down slightly over the last few years as fishing quotas are becoming increasingly precautionary in order to ensure sustainability of resources in Europe and the Americas. It is also worth stressing that 25% of fishmeal and fish oil is based on the use of by-products.

Use of fishmeal has substantially changed since 1960. In those years, there was a 50/50 split between chicken feed and pig feed. Since then aquaculture has gradually become dominant, so that in 2008 60% of fishmeal was used for aquaculture and only 30% for pig feed, with less than 10% for chicken feed.

As far as fish oil is concerned, we can notice a significant change in use between 1970 and 2010. It was largely used for hardened edible purposes in the 1970's, whereas in 2010 aquafeed is by far the largest use of fish oil, amounting to 80%.

Mr Shepherd underlined the essential role played by the market in the prices of fishmeal and fish oil. Fish diets are a mix of different ingredients in which soya represents an important part for most fed fish. Soya and fishmeal prices are closely linked. The average price of fishmeal is around 3 times that of soya meal. If this ratio goes up, formulators in business will try to reduce the fishmeal percentage and increase the soya percentage in the diets, which means that the price of fishmeal will tend to fall back.

Despite 10% annual growth in aquaculture, the usage of fishmeal and fish oil for aquaculture has remained steady in recent years. The reason for this stabilisation is the improved efficiency of their use to take advantage of their exceptional nutritional properties and long-chain omega-3s, the arrival on the market of substitutes, mainly vegetable ingredients, and the growing use of trimmings from processing of fish for human consumption.

Mr Shepherd replied to the concerns about the over-exploitation of the fisheries resources by explaining that sustainable aquaculture should focus on sustainable production of raw materials. In this regard, certification mechanisms play a critical role in promoting sustainability. It was noted that both the Marine Stewardship Council (MSC) and the International Fishmeal and Fish Oil Organisation (IFFO Responsible Supply Standard) base their certification on demonstrating that fishery stocks are managed so as to comply with the FAO Code of Conduct for Responsible Fisheries, thus eliminating illegal, unreported and unregulated fishing. An encouraging sign is that countries with the most significant fishmeal production, such as Peru, have developed precautionary fishery management policies. Mr Shepherd called on the EU to support and encourage this sort of initiative. "Sustainable

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aquaculture needs to ensure that only responsibly produced ingredients are in the diets used on farm", concluded Mr Shepherd.

- Recent trends in use of marine ingredients in aquaculture diets, especially for salmonids
  Einar Wathne, EWOS AS

According to EWOS figures, inclusion of marine ingredients has been reduced in the last 7-8 years from 60% to 45%. This can be further improved. The salmon industry and aqua feed industry use close to 50% of global fishmeal production. If we compare the efficiency in different animal protein production for food, salmon and all fish are extremely efficient in converting high quality nutrients to high quality food. Given that a lot of fishmeal goes for animal production, it should be a sustainability target to increase the proportion that goes for aquaculture. Aquaculture is the most efficient way of converting an available resource into high quality food, according to Dr. Wathne.

When looking at fish oil, the picture is slightly different: compared to the production of the salmon industry and the rest of aqua-feed industry, the majority of fish oil is being used for feed production. But this story can be changed: fish oil was previously used for hardening and technical purposes, where all the health part and benefits disappeared. The industry has been a vector for transferring fish oil into cheap, available food that has been to the benefit of the population for improved health.

The paradox is that this high consumption and over use of fish has been increasingly addressed in the feed industry. Actually, the industry has converted industrial products into healthy food that is distributed worldwide. The impact it has on public health is under-estimated. The social and economic impact of having farm fish that distribute omega 3 fatty acids has not been calculated. There are substantial benefits for the EU and world population in the distribution of these products and from the conversion of fish oil into foods. The use of marine resources should therefore be well controlled.

Regarding sustainability issues, in the framework of marine resources use, as long as trust exists in the fisheries resource management policy and control, there is no reason within aquaculture and salmon farming to question the sustainability of this food production. Yet, the industry needs further alternatives in order to grow: they need to have safe GM material available, and security over untapped resources of animal proteins that is available but that is used for other purposes. They also demand a more neutral way of calculating resource efficiency that is currently biased and incomplete, according to the industry. The aquaculture feed industry needs help to be able to ensure safety and availability of new ingredients to support the industry in being cost-effective and to promote aqua feeds.

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- The importance of long chain omega-3 fatty acids for human health
  Michael Crawford, London Metropolitan University

There are today five unquestionable facts: the brain is made of 60% of fat; the brain evolved in the sea using marine fats and continues to use the same resources today; the evolution of humanity depended on coastal resources; we are facing the most serious health crisis in humanity with the rise of mental and brain disorders; to satisfy a growing demand and due to the fact that aquaculture depends on marine resources, we may have to 'agriculturalise' the oceans.

Will plant fats replace fish fats? No! Can we get omega 3 plants to replace fishmeal? This would be wrong. The nutrition from fish is not just about DHA, it is also one of the richest sources of trace elements, which are depleted from the soils. It is commonly known today that there is a direct relationship between maternal consumption of fish and seafood during pregnancy and the cognitive development of children. There is great significance of the marine food chain (fish and seafood) both to human evolution and human intelligence.

In 1972, it was already predicted that unless something was done about this situation (it was already apparent then that fish were going down the tubes), there would be a rise in brain disorders, and that has already happened. The cost for brain disorders for the 25 EU states in 2007 was greater than any other burden of ill health in Europe – this is below the radar of the EC at the moment. This is greater than the cost for heart disease and cancer combined. By 2020, mental ill health will be 2nd in the global burden of ill health next to heart disease.

The solution, in addition to enhancing aquaculture in the right way, is also to be found in marine agriculture – Japan has set an example, where they have 'agriculturalised' an area in south Japan with government and local government funding. Marine agriculture is the only way of enhancing the supply of this vital food that is needed to expand a lot by 2015, for the future health and intelligence of children.

- A fish farmer's perspective on feed formulation and performance
  James Smith, Scottish Salmon Producers' Organisation

The farmer wants to produce a specific quantity and quality of product to set a standard throughout the year. The industry has product standards based on market requirements, such as niche products, lowest cost products, and so on. Production has to be able to supply appropriate sizes throughout the year for market demands.

The feed comprises approx. 45% of the costs of production. Costs are also based on forward purchase and availability of raw materials for feed suppliers. Feed conversion rate is very important. Time also has a cost implication; the longer it takes to grow the fish, higher the costs of production.

Regarding feed formulation, there are restrictions on raw materials due to retailer standards and requirements and animal by-product regulations. Restrictions are also imposed on the use of GM materials. There is a significant amount of substitution taking place, but plant proteins are less

digestible and need the correct balance of amino acids. With plant oils, they can only be substituted up to a certain proportion, but they do not contain long chain fatty acids. Fishmeal and fish oil are more efficient than other proteins. There is thus the need to improve the flexibility in the ingredient list, to allow the use of some raw materials.

Mr. Smith held that sustainability is becoming increasingly important, and it is mainly driven by the retailers and their focus on sustainable sea food and aquaculture products. There is a place for substitution but the downsides need to be considered when we come to it.

- Does feed fishing divert fish from human consumption?
  Professor Ragnar Tveteraas, University of Stavanger

Global supply of marine raw materials is roughly 100 million tons, out of which 20 million tons go directly to processing for fishmeal and fish oil. There are several determinants of use of fishmeal and fish oil, both on the demand and supply side: processing costs, transportation and storage costs, biological and economic substitution opportunities in animal and fish feeds (today, there is a broader scope of substitution opportunities than previously due to an increase in knowledge), and consumers' willingness to pay for the final animal or fish products with different fishmeal and fish oil inclusion rates. One advantage of fishmeal and fish oil is that weight is removed, thus reducing transportation costs, especially over long distances.

Development of some pelagic species has been observed, yet not for human consumption in the foreseeable future. There has been a reduction of fishmeal and fish oil for human consumption lately because of improvements in fishing catch and storage facilities, product development and development of distribution channels.

Supply and demand side measures are required in order to shift from feed to food and produce global welfare gains, reduce malnutrition and improve fishers' income. On the supply side, innovation and investments in fishing, processing transportation and storage technologies have to be made to lower supply chain costs. On the demand side, tastes, texture and the visual effectiveness aspect of food products have to be improved: generic promotion programmes may be necessary to communicate the benefits of food products to targeted consumers.

Fisheries lack property rights, which does not encourage investments in fishing and storage facilities on board. Economic risks and public good problems may lead to underinvestment. Dr Tveteraas recommends a pragmatic approach to conversion. We need to examine the biological challenges associated with each species as not all fish are recommended for direct consumption as food products. We also need to understand economic risks, market failures, and taste buds of (poor and rich) consumers.

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- Perspective of an environmental NGO on fishmeal/oil manufacture and usage
  Dawn Purchase, Marine Conservation Society

There is a rising demand for seafood because of population growth: seafood consumption *per capita* is also rising because of an increased need for a healthy diet that focuses on the sources of protein. This is leading to an increasing demand for fish protein but wild fish stocks are already at maximum capacity: 88% of European fish stocks are currently over-exploited, putting an increasing demand on aquaculture to fulfil this need for fish protein. That increased demand will also rely on fishmeal and fish oil for feed because our seafood choices are farmed carnivorous fish. FAO reports in 2006 and 2008 said that the maximum wild capture fishery potential from the world's oceans has been reached and this will apply to all fisheries, regardless of use.

Mrs. Purchase recommends looking elsewhere as well as using marine proteins and oils in a strategic way in order to maximise their benefits. Wild capture fisheries cannot expand to increase production of these resources.
As fish is going to be used for fishmeal and fish oil production, it is essential that these ingredients are sourced responsibly and sustainably. Marine raw materials for fishmeal and fish oil are limited, so there is the need to develop strategic use to deliver optimum nutritional benefits in the production cycle. It is important to ensure the maximum benefits of using fishmeal and fish oil for final products and to make sure that these feed ingredients are being diverted into the best protein converters, i.e. fish. Innovative alternative ingredients are available for use and should be increasingly used. Aquaculture needs to move from being a net consumer to be a net producer of protein.

- Reassuring the value chain and the consumer
  Aldin Hilbrands, Royal Ahold

All sources of interest groups (governments, suppliers, NGOs, stakeholders) have taken part in the WWF coordinated Aquaculture Dialogue process where feed fisheries sustainability has been extensively discussed. A consensus came out from this multi-stakeholder process, listing elements to consider when talking about sustainability: legal compliance, biodiversity, conservation, responsible use of resources, and the social dimension of sustainability. Stakeholders' fears concern the impacts of fishmeal and fish oil production on the environment: depletion of feed stocks, increasing production of fishmeal and fish oil that may lead to price increases in feed, price increases of products and consumer products.

Mr. Hilbrands deplored the fact that discussion has not really been taking place on the relative sustainability of fish oil and meal substitutes. There are other sustainability round tables going on related to palm oil and soy that are worthwhile using since they have operational sustainability certification schemes.

Sustainable feed fisheries are the key to a sustainable aquaculture industry. Contrary to the NGO opinion, there are also arguments for maximum inclusion of fish oil and fishmeal in fish feed because of the high retention rates in aquaculture species compared to livestock rearing. The relative

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sustainability of the substitutes has to be looked at in more detail in order to make a meaningful decision that truly contributes to fish feed raw material production sustainability.

3. Panel discussion chaired by François Simard (IUCN)

Mr. François Simard and his organisation IUCN have been working with the aquaculture sector for a number of years; he argued that the issue of fish feed is a very difficult one in terms of sustainability.

Mrs. Carol Phua from WWF argued that the options for discussion were limited and deplored the fact that the seminar failed to invite a panellist from the research sector to present options for the future. Innovation is needed to solve some of these problems: is it occurring or is it yet to occur? Problems of standardisation, methodology and conversion rates are confusing and presenters failed to present figures that would make it easier to then talk about possible regulations and guidelines on which to set limits for European imports and ensure that we are not encouraging unsustainable practices. In terms of aquaculture, the public still misses a lot of information on the production and commercial sector. This problem had also been raised by **Mr. Jean-Claude Cueff** who argued that we are not communicating very well to the public about this sector.

Mr. Wolfgang Krong from DG SANCO held that the use of feed additives is quite marginal in the aquaculture industry and that the increased use of feed additives would be a window of opportunity in terms of sustainability. **Mr Alberto Allodi** agreed with this view by arguing that feed additives have significant meaning for complementing different diets and helping aquaculture in becoming more and more sustainable.

Dr. Sachi Kaushik from INRA argued that there is considerable research within the EU in this particular area, something that seems to be ignored even within the EP. He stated that on the question of sustainability, we have been 'from least cost, to least risk, to most sustainable now.' The objective for scientists is to take into account different criteria to offer flexibility for the industry to adapt to changing circumstances and assess the possible consequences.

Prof. Gordon Bell argued that replacement is one way of making production more sustainable, but we need to be aware of the fact that if we replace with high levels of omega 6 oils, negative effects are observed on the health of both fish and humans.

Mr. Alberto Allodi from FEFAC pointed to 3 key dilemmas:

- Should we compete or try to differentiate? Should we switch from carnivorous to vegetarian feed? According to him, commitment to quality is essential and consumers' habits should not be changed.
- How to substitute marine materials that bring these beneficial effects? Omega 3's beneficial effects can be retained through correct management of diets and resources – it will be possible, thanks to research, to reconstitute its positive effects in the last phase of the fishes' life.
- Does it make sense to convert wild fish into farmed fish? The balance has already been reached, not under commercial circumstances but in test farms. Progress is fast and success is close.

Dr. Einar Wathne from EWOS brought 3 elements into light:

- We have the knowledge to impose good fisheries management policies on all fisheries: it is a political issue. Once in place, these principles will allow us to utilise resources into the aquaculture industry in a sustainable way, converting them into edible products and maintaining their health benefits.
- We must gradually reduce our dependency as we gain more knowledge of substitution: collaboration with European and global scientific groups is essential.
- Research on omega 3 supply is a key issue for the development of humanity. Aquaculture is a good vector for transferring this fish oil into edible products, but the challenge is that we need to supply far more people with limited resources.

Dr. Albert Tacon argued that fish requirements for nutrients depend on the money and resources available for producers: it is thus important, according to him, to ensure that the feed manufacturers are not restricted in terms of the materials that they can use as long as they are safe and sound.

Mr. Jonathan Shepherd stated that fish in, fish out ratios miss the point and should be ignored. Demonstrating responsible stock management is the key and should be based on compliance with FAO code of responsible fishing. This view is shared by **Mr. Blake Lee-Harwood** who argued that big pelagic fisheries need substantial improvements in their single stock management systems and eco-system based management methodologies applied. On the contrary, **Mr. Jean-Claude Cueff** argued that we should not solely concentrate on a stock management system but need a more complex eco-system-based approach.

"Whatever the use of the fisheries resources, i.e animal/fish feed or human consumption, we need to have an effective management of fisheries with reliable data", said **Dr Valdimarsson**. Producing ingredients to feed fish in a responsible manner is a prerequisite for the sustainability of the sector and a key element for the future of the aquaculture industry

Mr. Aldin Hilbrand held that enforcement of regulation is essential and that it is the responsibility of governments and Member States; **Dr. Ragnar Tveteraas** also sees a role for government. Harmonisation of efforts is essential, according to **Mr. Hillbrands,** and initiatives need to be brought closer together. Sustainability is a competitive issue in some markets, which requires a level-playing field. Yet, **Mr. James Smith** argued that it is essentially the market that will drive the speed of change to more sustainable raw materials in the future.

MEP Guido Milana recommended focusing efforts on research and on new technologies and techniques.

4. Conclusions: MEP Pat the Cope Gallagher

Mr Gallagher deplored the fact that 1/3 of the countries did not intend to undertake actions with a view to managing fisheries stocks. Regarding aquaculture, he regretted that Europe was lagging behind China which represents 44% of the aquaculture sector. A lot has therefore to be done to reverse the trend.

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Furthermore, Mr Gallagher underscored the important role of aquaculture in meeting the demand for food. He recalled that food production will have to rise by 70% by 2050 to cope with the 40% increase in world population. Fish will be a central part of the diet in the years to come.

The key question is therefore as follows: how do we meet this demand for food while ensuring sustainable management of our resources?
In his view, the only way of achieving this balance is involving all stakeholders and working together. He echoed what Mr Stevenson had previously said on discards. Discards will have to be reduced drastically and the European Parliament will play a major role in this issue discussed under the reform of the Common Fisheries Policy.

Mr Gallagher noted that the use of fishmeal and fish oil in feed fish has reached a plateau despite the growth of aquaculture. He pointed out that fish caught profitably for direct human consumption was ideal.
He welcomed precautionary fishery management policies adopted by most countries with significant fishmeal production such as Peru. These policies are reinforced by third party standards to encourage compliance with the FAO Code of conduct for responsible fisheries.

Mr Gallagher argued that the lack of marine ingredients will not restrict the growth of aquaculture, notably through using substitutes. However, owing to the significant part that fish represents in the diet of many farmed fish species, he concluded that a complete substitution of marine ingredients would lead to less healthy products for fish and consumers. “Consumers will not accept any decline in quality products”, he said.

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