

Food, Beverage &
Tobacco
Chile
Special Report

Chilean Fishing Industry: Temporary Setbacks in Salmon Cultivation

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Executive Summary

Led by explosive growth in the harvest of cultivated salmon over the past two decades, the fishing industry is now Chile's third largest export sector after mining and lumber. The salmon sector represents the second largest renewable source of export revenues, surpassing the fruit industry for the first time in 2006 and representing 3.4% of total exports in 2007.

Chilean fishing companies have played a major role in the development of global salmon cultivation since its inception in the mid-1980s, with salmon and trout export revenues growing at double-digit rates during most of this period. As a result, Chile now ranks sixth overall within the global fishing industry in terms of production and is the second largest salmon producer worldwide, just behind Norway.

In addition to focusing on the cultivation of salmon and other seafood (as growth in extraction has been limited by the establishment of quotas), the Chilean fishing industry has undergone a major consolidation process over the recent past. This has been brought about by both local and foreign investors, primarily from Norway, seeking to diversify their operations and achieve greater economies of scale through a merger with or acquisition of local companies.

The increasing importance of cultivation activities has had a positive impact on the overall fishing sector, as it has helped to offset restrictions in seafood extraction and add more value to the country's fishing exports through higher-priced products (e.g., Atlantic salmon, mussels and scallops) and product lines (e.g., cuts and formats). While the extraction of wild species tends to be more volatile than the harvest of cultivated seafood, the cultivation process faces its own challenges. Among the most prominent risk factors are diseases, which are by far the industry's most significant affliction at present, problems with the anchoring system, as well as loss of stock and environmental changes. Since late 2006, the Chilean salmon industry has been battling health issues, first through the appearance of the caligus parasite and later through the spread of the ISA (Infectious Salmon Anemia) virus, both of which primarily affected the Atlantic salmon species sold to the United States and European markets. In 2007, the impact on operating profits was devastating, as the industry was forced to destroy the affected cages and/or harvest the fish early in ISA infected areas. The industry was also faced with longer production cycles in caligus infected areas, as the parasite weakened the fish and made it more vulnerable to other diseases. In both cases, the industry had to contend with higher mortality rates and lower average weight at harvest, as well as skyrocketing medical expenses. While the caligus parasite has largely been contained, the ISA virus continues to spread throughout the country's salmon cultivation areas and is expected to dampen unit sales growth for 2008 as well. However, improvements in the treatment and containment of diseases should help the industry to overcome its health problems within the next two years and lower the impact of future outbreaks.

Thus, the industry's long-term prospects continue to be bright, as a worldwide trend towards lower-fat meats bodes well for future growth in seafood demand and hence, cultivation activities. In addition, fish consumption is still low in the United States when compared to other countries such as Japan, Spain and Chile itself. Due to its competitive advantages (ideal water temperature and inverse seasonality), Chile, the only major salmon producer located in the Southern Hemisphere, is expected to continue to be a primary beneficiary of these trends.

Health Issues Leading to a Collapse in Operating Margins

Since late 2006, the Chilean salmon and trout industry has been affected by a renewed outbreak of the caligus parasite. First detected in Chile in 1999, the caligus parasite had been successfully treated until the end of 2006 when the parasite became resistant to the drug used at that time, and higher water temperatures in the summer led to a more rapid spread of the disease. By September 2007, the industry was able to control the parasite, which weakens the host and makes it more vulnerable to other diseases, through the introduction of an alternative drug used in Norway.

ISA Virus Continues to Spread, Dampening Short-Term Outlook

On the other hand, the ISA virus, which is believed to have been introduced by imported salmon eggs, has not been successfully contained yet, causing a significant number of deaths among the affected groups. The mortality rate varies from 2%–50% depending on the density of the population and the amount of distress caused to the fish. Although the Servicio Nacional de Pesca (Sernapesca) established mandatory containment measures in 2007, such as the elimination or harvest of the affected cages and the introduction of surveillance and quarantine of the affected areas, the virus has been expanding to an increasing number of cultivation centers. According to Sernapesca, the number of centers reporting outbreaks (i.e., direct loss of fish life) has grown to 21 centers in April 2008 from five centers in September 2007 (out of 560 centers in total), with the virus expanding from the X to the XI Region in February of this year.

Over half of the centers reporting outbreaks, and 76% of the 17 centers currently under suspicion, belong to the Norwegian company, Marine Harvest, whose EBIT from Chilean and US operations plummeted to a USD155 million operating loss from a similar gain one year ago. After experiencing a 10% drop in its Chilean harvest, the company revised its growth strategy by limiting future expansion throughout the X Region, which contains most salmon cultivation centers, and instead focused on the XI and XII Regions in the far South. In addition, the company plans to accelerate the production of smolt in a controlled environment using the recirculation method and to establish an exclusive space on land to increase security of salmon egg supply. According to the company, all centers infected with the ISA virus will be eliminated in 2008. For the first stage in the cultivation process, which encompasses the first year of the salmon's life and takes place in fresh water, the amount of incoming smolt will be reduced by 40% and evenly distributed among low-risk, fresh water areas. The measures are expected to have a negative impact on harvest size over the next two years, with an estimated drop of 45% in 2008 alone.

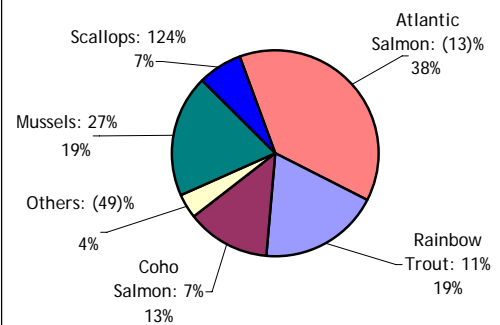
The average EBIT/kilogram of the sector's four publicly traded companies plunged by 47% in 2007, largely as a result of the aforementioned health problems, which were aggravated by the strengthening of the Chilean peso vis-à-vis the US dollar, which increased the relative cost of labor. In addition, industry profits were hurt by higher oil, food, energy and steel prices, as well as a decline in international salmon prices during the second half of the year. This year's scenario is expected to be similar to 2007's, with costs still on the rise and continued sanitary problems likely to reduce the size of

the harvest. As the EL Niña phenomenon may also have a negative impact on the extraction of wild species, export growth is expected to be slow, or even negative, for the overall fishing industry in 2008.

Export Revenue Growth Aided by Increased Value-Added Products

With the extraction of seafood in a general decline since 1995 (a trend that has been exacerbated by the establishment of fishing quotas for each company in 2001), the role of seafood cultivation has increased in importance (particularly in terms of exports) over the past decade. As a result, salmon and trout exports, which make up nearly 60% of all fishing exports, have become the main engine for the sector's dollar-revenue growth, displacing fishmeal from its number one position in 1997 and reaching an average of 4.4% of Chile's total exports over the past five years. Despite significant price hikes over the past few years, fishmeal accounted for only 1.1% of Chile's total exports between 2003–2007. It should be noted that while salmon continues to be the most cultivated species, its share has dropped to 71% in 2007 from 83% in 2005 due to both the aforementioned health problems as well as increased diversification through the development of other species such as mussels and scallops. The latter helped the sector to largely offset the 13% decline in Atlantic salmon harvest last year, with the net result being a 5% increase in the harvest of cultivated species.

2007 Harvest By Species
(Share of Total and % Change in Revenues)



Source: Subpesca.

Harvest by Species

(Thousands of Metric Tons)

	Atlantic Salmon	Rainbow Trout	Coho Salmon	Others	Mussels	Scallops	Total
2005	343	107	72	20	78	10	629
2006	374	145	106	59	124	27	809
2007	326	161	114	30	158	60	849

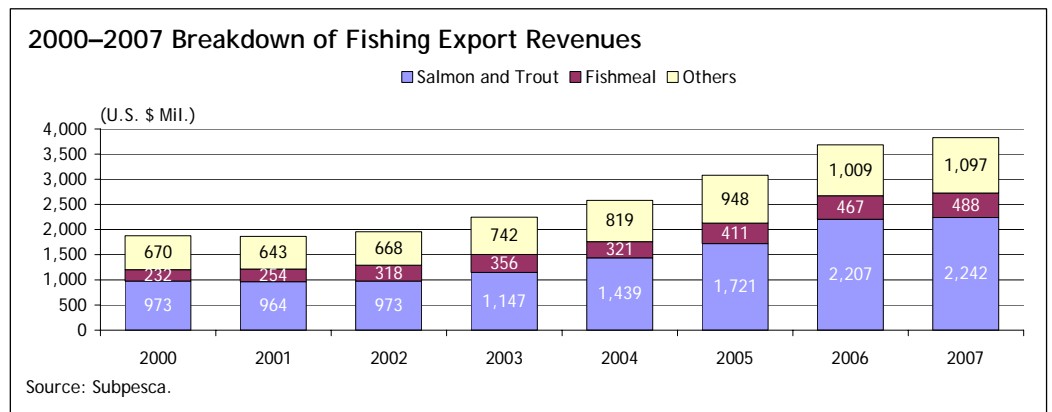
Source: Subpesca.

Export Revenues Growing at a Faster Pace Than Export Volume

The significant development in seafood cultivation combined with a regulatory framework that encourages seafood extraction for human consumption (therefore discouraging extraction for fishmeal production) has led export prices to increase at a faster pace than export volume. Considering that 62% of all external unit sales stem from seafood extraction, while 65% of total export revenues stem from seafood cultivation, the pricing is about 3:1 in favor of cultivation activities.

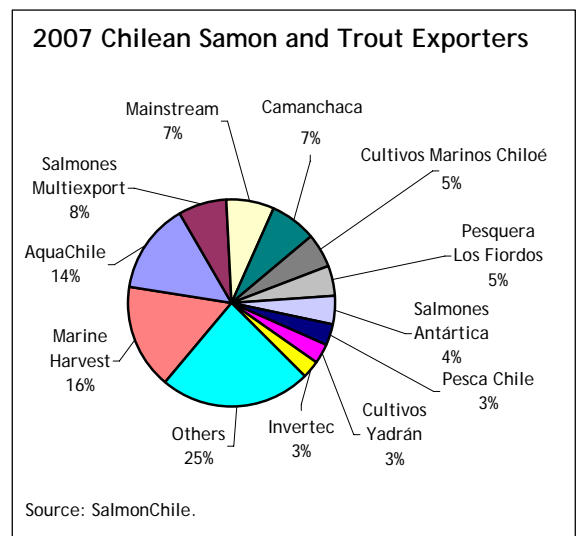
Fishing exports are highly diversified in terms of number of products (138), product lines (over 11), markets (129) and export companies. However, in terms of export revenues, the sector tends to be highly concentrated, with the three main products

(salmon, trout and fishmeal) and the two principal markets (Japan and the United States) representing over 70% and 50%, respectively, of total fishing export revenues. Concentration in export destinations is even more marked for the salmon and trout segment alone, with over 70% of its revenues stemming from shipments to the United States and Japan. The two markets differ significantly in terms of products and product lines, with the United States generally demanding higher value-added products (fresh and frozen Atlantic salmon steak and filet) than Japan (frozen, headed and gutted [H/G] trout and coho salmon), although Japan has shown a greater demand for steak and other higher-priced products over the past few years. Depending primarily on pricing for individual species, the United States and Japan have alternated in occupying the first place for consuming Chilean salmon and trout exports over the past five years, with the United States currently being slightly ahead of Japan. In addition, Chile has been aggressively entering other export markets in Europe (Germany, France and Russia) and Latin America (primarily Brazil).



Consolidation Process Triggered by Price Volatility

Price fluctuations have also had a significant impact on the industry's structure over the past five years. A substantial drop in revenues, caused by a sharp decline in prices (due to an oversupply of salmon worldwide), during 2001–2002 led smaller companies to be absorbed and others to merge in order to face the strong competition observed in international markets. The companies that survived the consolidation process were more vertically integrated and efficient, exhibiting a production volume of at least 20,000 metric tons per year. In addition, an increasing number of Chilean companies were acquired by foreign enterprises seeking to diversify their production or secure their supply of salmon. As a result, about 20% of all Chilean salmon producers are currently owned by Norwegian, Japanese and Spanish companies. In addition, international mergers and acquisitions that took place during that period also shaped



the local landscape, such as the acquisition of the Dutch company Marine Harvest by a Norwegian entrepreneur (who also owns a 100% stake in Pan Fish and a 24% stake in Fjord Seafood) in March 2006. Fjord Seafood acquired Delifish, the principal Chilean exporter of smoked salmon, in May 2006. Noteworthy is the high concentration observed in Chilean salmon and trout exports, with the ten largest companies (there are 80 companies in total) representing close to 75% of the industry's total export revenues. Also interesting is the fact that of the five largest salmon exporters (Marine Harvest Chile, AquaChile, Multiexports, Mainstream and Camanchaca), only Multiexports was able to report higher export revenues in 2007, with growth being generated primarily by medium-sized and smaller companies during that year.

Focus on Atlantic Salmon Allowing for Higher Value-Added Exports

In recent years, Chilean salmon exporters have been focusing on the cultivation of Atlantic salmon due to the higher prices obtained from greater value-added products related to this species. As a result, this type of salmon has increased its share of exports from 51% in 2000 to 62% in 2007, while the share of coho salmon dropped from 27% to 13% during that time (with trout—sold primarily to Japan—becoming the second largest export generator). Although the cultivation of Atlantic salmon takes about twice as long as the cultivation of coho salmon (20–42 months versus 18–20 months), it can be harvested year round (coho salmon is only harvested between December and March), its average weight at harvest is 4.2 kg (versus 2.8 kg for coho salmon) and it can be sold as fresh filet or smoked (whole, sliced, in vacuum), in individual portions or as blocks (whereas coho salmon is sold cleaned, whole, head on, frozen, and only to a lesser extent as frozen filet or filet in brine). Thus, the focus on Atlantic salmon has permitted companies to add higher value products to their exports by selling higher priced cuts (such as filet, which requires specialized labor) and more expensive formats, such as fresh and smoked.

Principal Export Lines

	Unit Sales (Thous. Metric Tons)			Revenues (Millions of USD)			Price (USD/Kilogram)		
	2006	2007	% Change	2006	2007	% Change	2006	2007	% Change
Frozen	552	574	4	2,050	2,053	0	3.7	3.6	(4)
Fresh-Refrigerated	106	117	10	657	731	11	6.2	6.3	1
Fishmeal	519	488	(6)	515	539	5	1.0	1.1	11
Canned	90	93	3	198	224	13	2.2	2.4	10
Smoked	7	7	(4)	70	74	6	10.1	11.1	10
Oil	62	72	16	44	53	21	0.7	0.7	4
Dried	41	52	25	33	40	24	0.8	0.8	(1)
Salted	3	2	(45)	18	10	(43)	5.2	5.5	5
Total ^a	1,391	1,413	2	3,683	3,827	4	2.6	2.7	2

^aIncludes other formats.
Source: Subpesca.

Chile's Unique Position in the Global Fishing/Salmon Market

The southern region's perfect environment for salmon production (which leads to faster growth and thus to lower production costs compared with other salmon producing countries) and the sector's focus on the shipment of higher value-added products has encouraged local and foreign investors alike to enter the Chilean salmon business in order to expand and diversify their operations. The accelerated development of salmon cultivation has led five Chilean companies to be placed among the top ten salmon producers in the world. As a result, Chile is now the second largest global salmon producer and by far the largest supplier of salmon and trout for the Japanese and US

markets, representing a respective 57% and 45% of these countries' total salmon and trout imports. In addition, it should be noted that Chile continues to be the second largest fishmeal producer worldwide (after Peru), despite the sector's increasing focus on other more lucrative segments (fishmeal exports now represent only 13% of the industry's total exports, versus 42% in 1991).

Competitive advantages for the extraction of wild fish (and therefore for fishmeal production, among other things) primarily consist of the high productivity of the marine ecosystem in this part of the world, with ocean currents enriching the waters with nutrients along Chile's 5,300 square kilometers of coastal area. However, most species are highly sensitive to changes in the environment, such as those produced by the El Niño and El Niña phenomena every three to six years, which often lead to the migration of wild species.

For the cultivation of salmon and other species, competitive advantages include inverse seasonality with respect to producers in the Northern Hemisphere, ideal solar illumination in the Puerto Montt area (X Region) and almost perfect water temperature, which in Chile (8–15 degrees Celsius) comes closer to the ideal (10–14 degrees Celsius) than in Norway (1–18 degrees Celsius). In addition, unlike Norway, where cultivation concessions are limited, the concession system governing the Chilean cultivation segment allows for the installation of new enterprises throughout the country.

Among the most prominent risk factors affecting seafood cultivation are diseases, which, although manageable, can lead to high mortality rates if not contained adequately, and environmental risks such as an increase in water temperature, which, through a larger presence of algae, can lead to lack of oxygen in the water. Rising water temperatures seriously affected production in 1986, with mortality rates reaching as much as 20%. However, mortality rates caused by algae have declined since then due to a greater diversification in the location of cages, among other measures. Other risks include the loss of stock through seal attacks and robbery, and problems with the anchoring system resulting in the loss of cages anchored to the bottom of the ocean. This risk increases along with harvest expansion due to the larger number and size of cages involved in production.

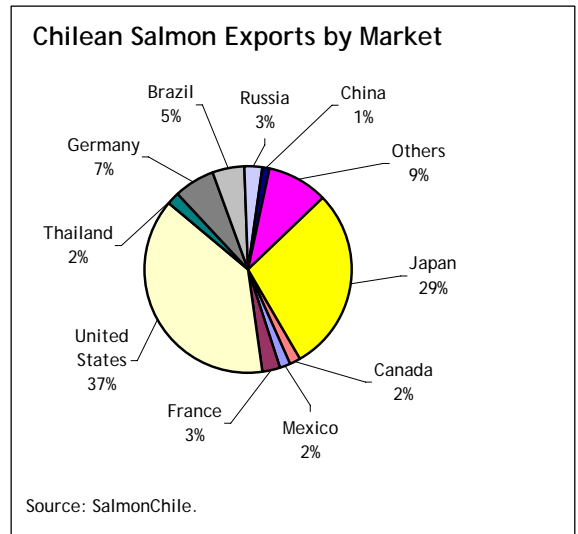
Global Trends in Fish Consumption Bode Well for Future Growth

Global demand for seafood is expected to continue to post solid growth in the future, given still relatively low per capita consumption in the United States, the second largest export market for Chilean salmon. Global seafood consumption is currently estimated at 16.6 kg/year, well below the 70 kg/year consumed in Japan and the 40 kg/year eaten in Spain. Even Chile, at 30 kg/year, still has significant room to grow.

Worldwide demand for salmon is expected to grow at an annual rate of 10%, as Chilean fishing companies have joined efforts with their counterparts in Norway, Canada and Scotland to promote global salmon consumption by highlighting the product's positive qualities. A worldwide trend away from red meat bodes well for future growth in fish demand. Due to the health benefits associated with seafood consumption, areas that traditionally consumed large quantities of beef, such as the US Midwest, have started to increase their fish intake. As a result, the purchase of frozen fish is becoming more common in that country. Until now, most of Chile's salmon exports to the United States have been shipped fresh, not frozen.

Challenges to Keep Up with High Demand and Reduce Price Fluctuations

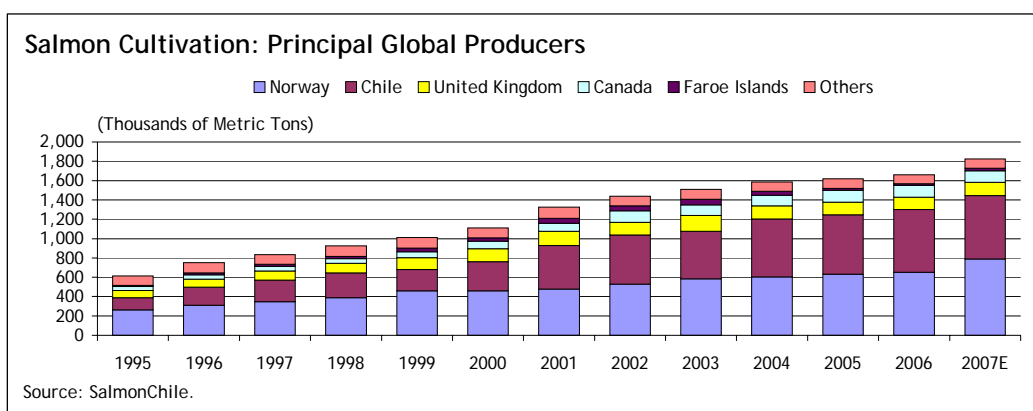
Given that the supply of extractable resources is limited and relatively volatile, future growth in seafood supply will largely depend on the further development of seafood cultivation, which is expected to expand its repertoire by adding other species such as southern hake, Chilean sea bass, snails, clams, razor clams, lobster, shrimp and crab. A greater diversification in species has already been observed over the past few years, with fish reducing its share of total production from an average of 95% in the 1990s to an average of 85% in recent years. In 2007 alone, the harvest of mussels and northern scallops soared by 27% and 124%, respectively, leading mussels to share second place with rainbow trout (each represented 19% of total harvest) and to surpass coho salmon by 6 percentage points. One example of increased diversification is AquaChile, the largest locally owned salmon exporter, which has expanded its business over the past few years to include the cultivation of tilapia in Costa Rica and mussels in Chile.



Although there is still plenty of room for growth in most of Chile's traditional export markets, Chilean fishing companies have been aggressively entering new markets, particularly in Europe and Latin America. In Europe, Chilean salmon producers are now selling some of their products directly to supermarkets, partly as pre-prepared meals. In addition, future price swings may be offset through increased flexibility on the production side by expanding the output of higher-priced products, such as smoked salmon, when salmon prices are low.

Another source of growth in the long term may stem from ocean cultivation. The cultivation of salmon in a marine environment is expected to eventually grow at a faster rate than fresh water cultivation, as companies will have to invest in larger cultivation centers. In order to be able to hold a larger stock, these centers need to be located in deeper areas with greater water renewal rates (i.e., with greater surf and wind exposure) in order to guarantee adequate growth and health. Although this type of cultivation already exists in its experimental phase in Norway and Russia, it requires a significant amount of engineering, technology, specialized labor, communication systems, logistics, etc., and is therefore not expected to be implemented in Chile any time soon.

Finally, in order to meet the continued growth in demand, companies will have to minimize mortality rates through the successful prevention/combat of diseases. Measures that have been successful in Norway, and that may be implemented in Chile in the near future, include the introduction of resting periods and the establishment of minimum distances between cultivation centers to limit the spread of diseases. In addition, both Norway and Scotland alternate between at least two medications with different molecular composition when treating a particular disease in order to minimize the risk of developing resistance to a specific product.



Conclusion

By exhibiting significant competitive advantages in the cultivation of salmon, which more than offset the country's remote location, Chilean fishing companies have been part of the boom observed in global salmon cultivation since the mid-1980s. Thus, while in the early 1980s wild species primarily captured in Alaska, Japan, Russia and Canada represented almost the entire production of salmon and trout worldwide, in 2006 cultivated species represented two thirds of the 2.5 million metric tons produced globally, with Norway, Chile, Canada and the United Kingdom taking the lead. Chilean export revenues, which had been growing at double-digit rates for the past two decades, slowed down dramatically last year to 1.6% in 2007 from an average annual rate of 23% between 2003–2006 due to higher mortality rates and lower weight at harvest caused by diseases. As the ISA virus has not yet been contained and production costs continue to be on the rise, profits are expected to remain sluggish in 2008. However, improvements in the treatment and containment of diseases should help the industry to overcome its health problems within the next two years and lower the impact of future outbreaks.

Salmon and Trout Exports by Species

	2000	2001	2002	2003	2004	2005	2006	2007	% Change 7/2006
Atlantic Salmon									
Millions of USD, FOB	492	525	570	687	876	1,079	1,418	1,385	(2)
Thousands of Metric Tons	95	140	162	155	197	229	213	200	(6)
Average Price (USD/Kilogram)	5.2	3.8	3.5	4.4	4.4	4.7	6.6	6.9	4
Trout									
Millions of USD, FOB	215	208	193	242	330	352	482	508	5
Thousands of Metric Tons	47	68	74	68	82	75	93	109	17
Average Price (USD/Kilogram)	4.6	3.1	2.6	3.6	4.0	4.7	5.2	4.7	(10)
Coho Salmon									
Millions of USD, FOB	263	230	206	211	232	284	299	308	3
Thousands of Metric Tons	64	92	94	62	76	79	79	82	4
Average Price (USD/Kilogram)	4.1	2.5	2.2	3.4	3.1	3.6	3.8	3.7	(1)
Others									
Millions of USD, FOB	3	1	5	7	1	6	8	41	410
Total Revenues (USD Mil.)	973	964	974	1,147	1,439	1,721	2,207	2,242	2

Source: SalmonChile.

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