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amorim: The Future of Natural Cork

Tim Krueger wrote this case under the supervision of Chris Laszlo and Katherine Gullett solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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In May 2015, one of Australia’s leading wine researchers was in Oporto, Portugal, for meetings. He walked into cork manufacturer Antonio Amorim’s foyer and declared, “The new Australian problem is *terroir*.” Amorim asked him to go outside and come back in: “Could you please go outside and come back in? I want to pinch myself so when you come back in, I know it’s real.”

For the past 14 years, Antonio Amorim had run Corticeira Amorim, S.G.P.S., S.A. (Amorim), the world’s largest cork manufacturing company. For him, Australia had been generally hostile territory because it was home to more cork critics than enthusiasts. Australian winemakers had for years pointed to cork as the source of their problems, and had mostly abandoned cork in favour of screw caps. A shift in their focus to terroir, the industry’s term for the way in which soil and climate factors interact with certain grape species, would be groundbreaking. It was a great day for Antonio.

Instances like this—small but significant indications of the cork industry’s resurgence—had become more commonplace in the period from 2010 to 2015. This trend was not accidental but rather, the result of intense industry-wide efforts to solve natural cork’s problems, specifically “cork taint.” Cork taint had become such a problem by the end of the 20th century that droves of vineyards around the world opted for alternative stoppers, such as synthetic cork and metal screw caps. Amorim responded with new strategies, research initiatives, and marketing campaigns. After a decade or more, it looked like these investments were paying off.

A positive future for the industry seemed attainable, and Antonio was particularly focused on three questions. First, how could his company continue to improve cork? Second, how could the industry do a better job of communicating the product’s remarkable attributes and environmental benefits? Finally, how could Amorim work with farmers to grow the long-term cork supply, enabling future growth?

Amorim’s employees had trouble containing the enthusiasm that made it clear they were ready to tackle these challenges. There was a pervasive sense of both excitement and gravity in this group of about 3,000 colleagues, who understood that the future of a 1,000-year-old industry rested in their hands.

**CORK AT A CROSSROADS**

Natural cork had enjoyed a near-monopoly in the wine stopper market for over 300 years. This situation brought profits and stability, but it had also allowed the cork industry to ignore big problems that were alienating its customers. Chief among these problems was the complex, enigmatic, and growing issue of cork taint, which was thought to have ruined up to 7 per cent of all wine produced in certain years (although misinformation had been so prevalent in this highly contentious industry battle that it was hard to know for sure). Cork taint occurred when chemicals used in processing interacted with a natural fungus in the cork to produce trichloroanisole(TCA), a chemical compound that left an overwhelming musty smell and taste in affected wines. By 2000, cork’s reputation was so tarnished that innovators saw an opportunity to develop cork alternatives such as plastic stoppers and screw caps, and large numbers of vineyards eagerly embraced these. The share of wine bottles capped with cork dropped from 95 per cent in the late 1990s, to 60–70 per cent by 2013.[[1]](#footnote-1)

Since 2000, the cork industry had made enormous progress in solving cork taint. Amorim had led the charge, investing hundreds of millions of euros in research and development, new equipment, and vertical integration initiatives that were all geared toward securing a long-term future for the industry. These strategies had worked so well that, by 2015, many industry insiders felt the problem could soon be a thing of the past.

However, the cork industry’s challenges were far from over. Winemakers had long memories, and many remained unconvinced that returning to cork was a safe choice. Because fine wines may sit in a bottle for over a decade, some of the best wine bought and consumed in 2015 still suffered from problems the cork industry had faced in the late 1990s and early 2000s. How could the cork industry shift consumer perceptions when problems from past decades still lingered in the marketplace? Meanwhile, many customers had become accustomed to screw caps and synthetics. Was this a permanent preference or merely a temporary trend?

Finally, in light of the upheaval this industry had faced, cork manufacturers worried about whether Mediterranean landowners would continue to plant new cork trees or devote land to less sustainable trees that promised quicker profits. How could a company like Amorim convince growers that natural cork would always have a place on top of the wine bottle, given all the recent turmoil?

As the industry’s leader, Amorim faced all of the above challenges and more. Its leaders knew that if they did not finance the majority of the marketing, research and development, product innovation, and sustainable forestry practices, nobody else would. They also knew it would take years for smaller cork companies to implement many of the expensive quality-control measures Amorim pioneered. In the meantime, any low-quality cork produced by smaller companies would reflect poorly on the whole industry.

**PRODUCING CORK**

Cork was the bark of the *Quercus suber* tree, more commonly known as the cork oak. Indigenous to the Western Mediterranean Basin, cork had historically been grown commercially in seven countries: Portugal, Spain, France, Italy, Morocco, Algeria, and Tunisia. By the early 21st century, 80 per cent of all cork was harvested from the Iberian Peninsula (50 per cent from Portugal and 30 per cent from Spain). Each tree could live, on average, between 150 and 200 years.

Cork oaks had a unique molecular structure that allowed them to regrow their bark. For hundreds of years, specially trained workers harvested cork each summer, using an axe to remove the outer layers of bark without harming the tree. The cork was typically harvested first when the tree was 25 years old, and then roughly every nine summers thereafter. However, the industry did not consider cork moist enough to be suitable for wine stoppers until the third harvest, when the tree was 43 years old. This protracted timeline meant cork forests were profitable only as long-term investments.

By 2015, global cork manufacturing had evolved to follow a specific process: After the harvest, manufacturing companies bought raw cork strips from growers or intermediaries. These companies negotiated prices each year based on demand and harvest quality. After curing and boiling the raw cork, manufacturers used it to produce a variety of products, ranging from construction materials to surfboards. Wine stoppers, however, generated the largest share of revenue throughout the industry. According to Antonio, “There is no other product in cork today that adds as much value as cork stoppers. If I don’t have the cork stopper, I cannot pay as much to the cork grower. If I cannot pay as much to the cork grower, the guy is going to be planting something else.”

Amorim sent its highest-quality bark (thick bark with small pores and just the right moisture level) to workers operating cork-punching machines with their hands and feet. These employees worked eight-hour shifts and punched an average of 14,000 stoppers per day. The rest of the stopper-quality bark went to robots, which used sensors to orient the bark correctly and punch corks perpendicular to the grain. Robots operated 24 hours per day and punched an average of 105,000 stoppers in that time. Yet unlike humans, robots could not use judgment to punch around flaws. The cork-punching processes used about 20 per cent of the raw cork, and the rest was ground into granules that would be compressed into technical corks, also known as composite corks. Most cork stoppers sold by 2015 were made from these compressed cork granules. Amorim sent on the leftover materials from this process to be used as biofuel or products unrelated to wine.

Cork manufacturers then sold these corks to winemakers around the world, who mostly bottled their product in house. A company like Amorim maintained relationships with large and small vineyards from New Zealand to California.

**WHAT WAS AT STAKE**

While it was illegal to cut down cork trees in Portugal, other cork-producing countries did not have such rigid protections. Eucalyptus, used in paper manufacturing, promised a much shorter payback period than cork. However, non-native alternatives degraded the soil over time, and did not support the same biodiversity that cork oaks did. Cork oak forests were critical to the Western Mediterranean ecosystem in 2015. They formed habitat for hundreds of other species of plants and animals, including endangered species such as the Bonelli’s eagle, Spanish imperial eagle, Iberian lynx, and Barbary deer.[[2]](#footnote-2) Finding ways to maintain demand for natural cork had direct implications for the preservation of cork oak forests and the ecosystems they supported.

Cork’s ecological benefits were not confined to the Mediterranean region, as forests were carbon sinks. According to the Cork Quality Council, each cork stopper represented about 113.5 grams of carbon offsets.[[3]](#footnote-3) By comparison, alternative closures were typically made of petroleum-based products or metals, which were not biodegradable and were much more energy intensive to manufacture. A 2008 PricewaterhouseCoopers study found that the lifecycle carbon emissions associated with producing and transporting plastic closures were about 10 times those of natural cork, and the carbon emissions associated with screw caps were about 24 times those of natural cork.[[4]](#footnote-4) According to Amorim, using a cork instead of an alternative closure reduced a wine bottle’s carbon footprint by 18–40 per cent.[[5]](#footnote-5)

Amorim’s manufacturing facilities were particularly environmentally friendly thanks to the company’s use of biomass in boilers and in a cogeneration plant; started in the 1980s, this was one of the first biomass cogeneration units installed in Portugal. All cork powder and dust not used for retail products was used to produce energy. According to Paulo Bessa, Amorim’s director of corporate sustainability, the use of biomass satisfied 60 per cent of Amorim’s energy needs.

The cork industry was also an important source of middle-class jobs in the economically struggling Iberian Peninsula. In 2015, Spain and Portugal had two of the five highest unemployment rates of all European Union countries.[[6]](#footnote-6) According to Amorim, cork harvesting was the highest paid agricultural job in Europe. About 10,000 skilled workers depended on income from the annual cork harvest. In addition, the cork manufacturing industry employed nearly 12,000 workers in the Iberian Peninsula.[[7]](#footnote-7) Finally, 90 per cent of the cork produced in this region was exported; economists generally agreed that export industries improved a nation’s balance of trade and created important multiplier effects throughout the economy.

**A BROKEN MONOPOLY**

While the cork industry was enjoying its centuries-old monopoly on top of the wine bottle, winemakers were slowly accumulating a list of grievances against natural cork. By 2000, the international community of winemakers was overwhelmed with horror stories about large quantities of wine lost to bad cork—probably somewhere between 5 and 9 per cent by the turn of the century.[[8]](#footnote-8) The issue had devastating effects on both profits and reputations.

Carlos de Jesus, Amorim’s marketing director, readily admitted that the cork industry was slow to respond. For years, the most common approach among cork manufacturers had been either to deny that TCA was a big problem or to blame the problems on competitors. Because of the third-party cork distributors, it was very difficult for anyone to be sure about the origins of a certain bad batch. Of course, Amorim and the other cork companies eventually realized that this squabbling over whose cork was worst only served to erode the reputation of cork in general. The cork industry had lost control of its product’s narrative.

Frustrated with the industry’s reluctance to take TCA seriously, winemakers began looking for viable alternatives. A number of options existed, including boxed wine and glass stoppers. The two main alternative closures to emerge were metal screw caps and synthetic corks made of plastic. However, each presented its own set of problems.

A French company had developed a basic wine screw cap called the Stelvin cap in the 1970s. Some winemakers were initially attracted to the concept because, in addition to solving the TCA problem, screw caps negated the need for corkscrews. They also made long-term storage easier for retailers and consumers. Wine bottles with natural corks were ideally stored horizontally in order to keep the cork moist, thus preserving a perfect seal, but bottles with screw caps could be stored vertically.

As of the early 2000s, however, screw caps had failed to catch on as a popular wine closure. Shipping was a big concern. A slight nick at the top of the bottle could break the whole seal. Moreover, screw caps required winemakers to make a significant up-front investment in the form of new bottling machines—a major risk for a product that winemakers were not sure the public would buy. Winemakers also needed new, more uniformly shaped bottles with ridges for the caps. Because cork was forgiving, bottles destined for cork stoppers did not require tight manufacturing tolerances. Contrastingly, screw caps required precision, which required collaboration with the bottle manufacturers. Finally, winemakers had no information on how their wine would perform under screw caps in the long term—whether contact with the new type of seal would negatively affect the wine’s taste and whether the wine would age better or worse than with a natural cork. In fact, winemakers soon found that the completely airtight seal created by screw caps could cause a process called reduction, whereby an aging wine developed sulphuric flavours. Learning about and mitigating some of these long-term taste concerns involved years of trial and error. Even by 2015, screw caps were generally used only for wines intended for consumption within a year of bottling.

Possibly the largest hurdle for screw caps was their association with cheap wine. In the 1970s, some Australian vineyards had partnered with airlines to introduce screw caps as a convenience for travellers. They made the mistake of doing so only in the economy section, while continuing to use corks for wine served in business and first class. When it came time to take the technology mainstream, Australians rejected it, stating that screw caps made them feel they were drinking cheap wine.[[9]](#footnote-9)

The main problem with synthetic corks, at least initially, was that they did not exist. Entrepreneurs realized that such a product would be a major success and began developing prototypes as early as 1990, but the path to a viable synthetic cork was long and riddled with spoiled wine. Eventually, two functional synthetics emerged: Cellucork, manufactured by a British company, and Supreme Corq, made by a company based in Seattle, Washington. Both closures were somewhat more rigid than the spongy synthetics available by 2015, and both had oxidation problems (that is, they did not always form a complete seal). Consumers also had a lot of trouble getting synthetic corks out of wine bottles. As with screw caps, vineyards were concerned about customers’ perceptions of quality as well as the unknown variables of taste and long-term performance. Some were still frustrated enough to entertain alternatives.

Australians were the most willing to abandon cork. Their comparatively young wine industry had only begun to flourish after the Chernobyl disaster in 1986 caused concerns about fallout in vineyards across Europe, and European grocery stores scrambling to keep shelves stocked turned to Australia. The Australians did not have the centuries-old commitment to cork that many European and South American vineyards had. They also suspected that cork producers were keeping higher-quality cork for their friends in Europe and dumping the problematic cork in Australia and New Zealand.[[10]](#footnote-10) This claim was difficult to substantiate, but the rumour certainly contributed to Australia’s dissatisfaction with natural cork.

In 1995, Southcorp, which at the time produced 20 per cent of Australia’s wine under brands such as Penfolds Wines and Lindeman’s Pty. Ltd., was the first large, export-oriented winemaker to begin transitioning to Supreme Corq. Yet it was screw caps that eventually seized the Australian market. In 2000, the number of Australian wine bottles topped with screw caps was about 300,000. By 2007, this figure had grown over 50,000 per cent, to 160 million bottles (120 million litres). By 2011, about 70 per cent of Australian wine and 90 per cent of New Zealand wine was sealed with a screw cap.[[11]](#footnote-11) These were not just cheap wines either; some vineyards topped their most cherished US$180[[12]](#footnote-12) vintages with screw caps. Although the percentage of Australian winemakers who continued to use natural cork for all or some of their product line was much greater than 30 per cent, a relatively small group of vineyards produced the majority of wine in nations like Australia and the United States. Thus, decisions made by export-oriented vineyards had an outsized impact on the overall percentage of bottles capped by alternative closures. This wine mostly retailed for under $15 per bottle, and was usually consumed within 48 hours of purchase.

Meanwhile, the use of synthetic cork surged in the United States, and by 2015, about half of all U.S. wine was topped with synthetic cork.[[13]](#footnote-13) Cork’s global market share dropped to somewhere around 65 per cent of wine bottles by 2013. (Studies tended to report contradictory information because, in reality, no one knew the exact number.)[[14]](#footnote-14) This represented a market-share erosion of about one-third since 2000. The long monopoly had ended, and it was uncertain which material would dominate the wine closure market in the future.

**AMORIM’S QUEST FOR SOLUTIONS**

Relative António Alves Amorim founded a small cork company in 1870, then opened a new shop when he realized his business partner had been cheating him out of profits for years. He founded Amorim & Irmãos Lda. in 1922. At the time, the cork industry was fragmented both horizontally and vertically. Portuguese cork manufacturing took place in small, family-operated shops, while most of the country’s raw cork was exported to France and Spain for production. Central components of Amorim’s strategy during the 20th century included consolidating both raw-material processing and cork manufacturing within Portugal, and eventually selling directly to vineyards. Joana Mesquita, in the company’s public relations department, described the situation before Amorim’s third generation of management decided to forge direct customer relationships:

We were selling to somebody who would sell to somebody who would sell to somebody, and the cork would then arrive in the [United States]. We had no contact with the winemaker. If the middleman would mix Amorim corks with a ton of other suppliers, we wouldn’t know. A lot of the Portuguese companies today are still in that stage of getting out of Portugal, and we’re farther away—we did that 30 to 40 years ago.

As a result of its consolidated production processes and direct customer relationships, Amorim became the industry leader. The company went public on the Lisbon Stock Exchange in 1988. By the time Antonio Amorim became chief executive officer in 2001, the company was producing 2 billion corks per year, which represented about one-quarter of the world’s cork wine stoppers at the time. Antonio had taken the reins during a difficult time for cork. Before the company could even determine the best way to go about saving cork’s future, it needed to make an even more fundamental decision. In Antonio’s words, “The most important decision that we made was to stay in cork. We could have sold ourselves out to plastics or screw caps. We said, ‘No. We are a cork company, we exist to add value to cork in whatever form or shape. That’s what we believe in. And we think we can do better than what we have done so far.’”

The company’s strategy had many components. First, it needed to become the world leader in TCA knowledge. Tired of receiving rejected cork shipments from customers, Amorim bought all the testing equipment its customers were using and more. The company also started a TCA research lab, where about seven chemists studied the causes of and remedies for TCA; the price tag for all of this was hundreds of millions of euros, but Amorim saw it as necessary to save the company.[[15]](#footnote-15)

Second, Amorim vertically integrated as a strategy for controlling quality. It opened a raw materials company to buy directly from cork farmers, and was buying 95 per cent of its cork through its own channels by 2006—up from 25 per cent 15 years earlier.[[16]](#footnote-16) This allowed the company to build an extensive database for tracing quality problems back to specific farmers. Long-term relationships with growers also allowed Amorim to encourage sustainable forestry practices, which benefited the ecosystem and helped eradicate TCA at the source. Although few customers demanded it, Amorim began paying more for cork that met sustainable forestry certifications.

Third, Amorim diversified its products. It invested in research and development to develop new, more competitive closures, which resulted in a range of technical corks with various cost-saving and performance-enhancing attributes. In 2015, these stoppers sold for as little as €0.02 each.[[17]](#footnote-17) In an initiative designed to steal the advantage of convenience from screw caps, Amorim partnered with a bottle manufacturing firm to develop a twist-out cork called the Helix. The company also diversified to include products outside the wine industry; although minuscule in volume compared to its wine stopper business, its beer-stopper business grew. Amorim also rolled out new products in three other business units: floor and wall coverings, insulation, and high-tech composite cork products (see Exhibit 1).

Finally, Amorim sought industry-wide solutions. The firm worked with the European Cork Confederation to raise standards over time, and it worked with the Portuguese Cork Association to launch a marketing campaign called “100% Cork.” In 2014, in the cork industry’s first effort to market directly to wine consumers, 100% Cork bought Facebook ads and radio ads in Northern California.

These efforts were successful. By 2015, evidence indicated that less than 1 per cent of the finished corks leaving Amorim had detectable amounts of TCA. The figure for the rest of the cork industry was not very far behind Amorim.[[18]](#footnote-18) While it was not clear whether cork was gaining territory back from alternative closures, it no longer appeared to be losing ground.

**AMORIM’S POSITION WITHIN THE CORK INDUSTRY**

The Portuguese countryside was still dotted with between 300 and 400 smaller cork companies. While most of these firms followed quality standards similar to Amorim’s, dozens did not.[[19]](#footnote-19) These renegade companies produced up to 10 per cent of Portuguese cork, and they posed a big challenge for those attempting to eradicate TCA entirely and solve the problems with cork’s worldwide reputation. At the same time, cork’s disastrous decade had created opportunities for Amorim. Many smaller cork companies either went out of business or lost customers, and Amorim was there to pick up the slack. As Antonio explained, “Today we are selling 4 billion cork stoppers worldwide annually. When cork had 90 to 100 per cent of the market share, we were selling 2 billion.”

From 2005 to 2015, the company’s revenue had grown steadily at an average annual rate of 2.7 per cent: it had increased from €429 million in 2004 to €560 million in 2014. Perhaps counterintuitively, a greater percentage of Amorim’s sales and profits in 2014 came from its wine stopper business than they had a decade earlier. The share of total sales attributable to stoppers rose from 53.9 per cent in 2004, to 63.1 per cent in 2014. Further, the company’s cork stoppers business unit was the main customer of its raw materials business unit, which meant the raw materials unit was also essentially in the wine business. The combined earnings before interest, taxes, depreciation, and amortization (EBITDA) of these two business units was 74.2 per cent of Amorim’s total EBITDA in 2014.[[20]](#footnote-20)

Amorim’s largest competitor was a French company named Oeneo, founded by a Spanish individual who fled to France during the Spanish Civil War. Oeneo’s 2014 revenue was €190 million, although about half of this revenue came from making wine barrels. Oeneo’s production capacity was about 1.3 billion closures per year.[[21]](#footnote-21)

**THE FUTURE OF CORK**

When Antonio took over management of his family’s company in 2001, he knew that Amorim would either need to make big changes or face extinction in 15 years. Now that the company had secured a safe and profitable niche for the time being, its managers began looking to the next 30 to 50 years. They had made a commitment to stay in cork, but what type of cork products would they pursue? Was remaining dependent upon stoppers too risky a strategy for Amorim? Was there a way to diversify away from stoppers without giving up profits and spreading the company’s competencies too thinly?

If Amorim committed fully to the battle against alternative stoppers, what should be the basis of its competitive positioning? When surveyed, many winemakers cited the low cost of synthetics and screw caps among the primary reasons for choosing those closures over cork (see Exhibit 2). This observation put pressure on the cork industry to lower its prices. If Amorim engaged in a cost-cutting race to the bottom, however, would it risk repeating the folly of the first-generation screw caps in the 1970s? The company preferred to condition its customers to pay more for cork. Antonio, who sometimes used soccer metaphors to explain the battles within his industry, articulated the challenge his company faced in trying to sell cork for its full value:

We have analysis on the product lifecycle of cork compared to plastics compared to screw caps. We beat them eight [to] nil. And then we have to go to a customer, to the market and justify why cork is 1 cent more expensive than the plastic. In many other products, such superior performance would yield a much higher premium than 1 or 2 per cent.

Was price-based competition necessary to arrest the rise of alternatives, or would it come back to haunt Amorim’s margins in the future?

Antonio had an even bigger concern than alternative stoppers when thinking toward the future: how long would the company be able to keep growing? Amorim could potentially expand in two directions, but both involved big challenges. Ideally, it would like to grow the number of cork stoppers being used worldwide. Unfortunately, neither wine production nor consumption had seen any real growth in the last decade (see Exhibit 3). In fact, revenue among winemakers had declined at an average annual rate of 3.1 per cent from 2010 to 2015, as other types of alcohol grew in popularity and winemakers struggled to resolve industry-wide oversupply issues.[[22]](#footnote-22)

Unless these trends reversed, growing global demand for cork stoppers would likely necessitate winning back market share from screw caps and synthetics. Doing this would mean increasing the total supply of cork, which in turn involved convincing landowners to plant more cork trees. The myth of a global cork shortage had been a strangely effective marketing tool used by the alternative stopper industries, but until then, it had remained a myth. If cork was able to start growing its market share again, the future might be different. How could Amorim convince landowners to plant more trees that would not yield wine-grade cork for 43 years when cork had lost one-third of its market share in the last 15 years?

Should Amorim pursue further vertical integration, buying cork forests to try to better align supply with long-term demand projections? Buying up half the Portuguese countryside would be expensive, and another push for vertical integration might spread Amorim too thin, taking the company outside of its core competencies and forcing it to internalize the risk of future oversupply.

Alternatively, Amorim could grow at the expense of other cork companies. While this strategy may negate the need to plant more cork trees, it would bring other challenges. Would Amorim need to cut prices to undermine its competitors? Would there be a way to ramp up production without driving up the price of raw cork? Would intense competition against other cork companies risk undermining all the goodwill and cooperation on marketing and quality initiatives—efforts that Amorim saw as critical to improving cork’s global image?

Finally, if Amorim were able to resolve all of these challenges and achieve consistent growth into future decades, what should its geographic strategy look like? Wine production was strongly clustered in 20 countries, which produced over 93 per cent of all wine in 2011. However, these countries were spread throughout the world; the top nine wine-producing countries in 2011 were spread over six continents (see Exhibit 4). Should Amorim focus on all regions equally, or should it focus its growth in certain regions? Should it focus on hostile areas like Australia and New Zealand, traditional European strongholds, growth markets like China and the United States, or in-between areas like South Africa and South America?

exhibit 1: amorim’s EBITDA, contribution by business unit (€ thousands)

|  |  |  |
| --- | --- | --- |
| **Business Unit** | **2014 EBITDA** | **% of company EBITDA** |
| Raw Materials | 17,492 | 20.2% |
| Cork Stoppers | 46,830 | 54.0% |
| Insulation Cork | 1,653 | 1.9% |
| Floor and Wall Coverings | 15,520 | 17.9% |
| Composite Cork | 7,748 | 8.9% |
| Other | (2,520) |  |
| Consolidated EBITDA | 86,722 |  |

Note: €1=US$1.38 on March 31, 2014.

Source: Company documents.

EXHIBIT 2: CLOSURE TYPE COMPARISON (US$)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Closure Type** | **Approximate Market Share** | **Retail Price** | **No TCA Risk** | **Minimal Oxidation Risk** | **Easy to Ship** | **Compatible with Traditional Bottling** | **Can Be Stored Vertically Long Term** | **Biodegradable** |
| Cork | 63% | $0.03–$3.00 |  | x | x | x |  | x |
| Synthetic Cork | 14% | $0.15 | x |  | x | x | x |  |
| Screw Cap | 23% | $0.07–$0.25 | x | x |  |  | x |  |

Source: Company documents.

EXHIBIT 3: GLOBAL WINE PRODUCTION AND CONSUMPTION IN MILLIONS OF HECTOLITRES

Source: Created by the case authors from “The World’s Biggest Wine Producers,” Business Tech, May 6, 2015, accessed September 20, 2015, <http://businesstech.co.za/news/lifestyle/86672/the-worlds-biggest-wine-producers/>.

EXHIBIT 4: WINE PRODUCTION BY COUNTRY IN THOUSANDS OF HECTOLITRES

|  |  |  |  |
| --- | --- | --- | --- |
| **Rank** | **Country** | **2011** | **% of Global** |
| 1 | France | 50,757 | 19.0% |
| 2 | Italy | 42,772 | 16.0% |
| 3 | Spain | 33,397 | 12.5% |
| 4 | United States | 19,140 | 7.2% |
| 5 | Argentina | 15,473 | 5.8% |
| 6 | China | 13,200 | 4.9% |
| 7 | Australia | 11,180 | 4.2% |
| 8 | Chile | 10,464 | 3.9% |
| 9 | South Africa | 9,725 | 3.6% |
| 10 | Germany | 9,132 | 3.4% |
| 11 | Russia | 6,980 | 2.6% |
| 12 | Portugal | 5,622 | 2.1% |
| 13 | Romania | 4,058 | 1.5% |
| 14 | Brazil | 3,460 | 1.3% |
| 15 | Austria | 2,814 | 1.1% |
| 16 | Greece | 2,750 | 1.0% |
| 17 | Hungary | 2,750 | 1.0% |
| 18 | New Zealand | 2,350 | 0.9% |
|  | Total Top 18 | 246,024 | 92.0% |
|  | World | 267,279 |  |

Source: International Organisation of Vine and Wine, *State of the Vitiviniculture World Market,* April 2015, accessed December 5, 2016, at www.oiv.int/public/medias/2935/oiv-noteconjmars2015-en.pdf.

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