

# Spiber's Brewed Protein™ in Japan: Advancing Sustainability & Circular Economy



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## Introduction

Spiber, a Japanese biotechnology company, is believed to have been one of the pioneers in developing Brewed, an innovative category of reusable materials produced through fermentation. These materials replace those derived from animals, vegetation, and manufacturing facilities. Their most important application is in the textile industry, which is also their primary field of use. The objective is to bring about a significant transformation in the fashion and textiles industries. This will result in a more circular and environmentally friendly economy in the long term.

## Spiber's Brewed Protein™ Materials: Forerunners in Eco-Friendly Innovation

Spiber has created a novel technique for creating Brewed Protein™ materials, which uses the metabolic benefits associated with fermentation [1]. Traditional fabrics can be replaced with these alternative materials, which will reduce the amount of animal skins, plants, and synthetic materials required [2]. This proposition can bring about significant change in how things are done and clear the path for a more environmentally conscious and morally responsible business sector. Products made by Brewed Protein™ need to be utilized by a vast number of people for there to be any hope of resolving the significant environmental issues that we face today. When these products are made, the emissions of greenhouse gases, water use, and land usage issues are minimized. They naturally deteriorate, and as a result, when they are no longer helpful, they leave behind very little evidence.

The decision made by Spiber to site large-scale fermentation facilities close to agricultural croplands exemplifies the company's dedication to preserving a business model that is environmentally

friendly and can be maintained for the long term. Spiber can guarantee the ethical purchase of feedstock due to its ties with reputable suppliers and its use of farming practices that are kind to the environment. This enables Spiber to fulfil its responsibility to its customers. Their commitment to protecting the environment is evidenced by various elements, such as their Sustainable Sourcing Policy, their Sustainability Impact Report, their links with suppliers, and their partnerships with non-governmental groups [3].

Products made with Brewed Protein™ are used not only in the garment business but also in the construction sector, the artificial hair industry, the medical device industry, and the automotive components industry. These materials have been shown to showcase their versatility and potential in a range of different sectors, and this was accomplished through partnerships with well-known companies. Spiber plans to expand production while cutting expenses to make Brewed Protein™ materials more readily available and competitively priced. By expanding their reach beyond the garment sector and studying related fields, they aspire to establish a lot in which Brewed Protein™ products are widely recognized and accepted as ecologically acceptable alternatives worldwide.

## Sustainable and Versatile Materials

Brewed Protein™ can be used to create various materials, such as filament yarn, staple fibre, knit fabrics, woven fabrics, denim, fleece, fur replacements, and leather substitutes [3]. Not only can these materials offer a diverse selection of textures and powers, but they also solve the environmental problems linked with using more traditional materials. They are both biodegradable and

biobased, which respectively suggest that they are derived from natural sources and capable of being broken down biologically over time. In addition, goods made with Brewed Protein™ are more environmentally friendly than other options since they require less water, produce fewer emissions of greenhouse gases, and cause less damage to the soil [4].

### Spiber's Technology Platform

The manufacture of Brewed Protein™ components at Spiber is carried out in a method that consists of a stringent five-step process [1]. The technique begins with the collection and analysis of a variety of natural materials, as well as information on the genetic makeup of the organism. Following this step, the sequences of DNA and amino acids that will be incorporated into the construction of specific polymers are established. Fermentation is the procedure used to produce these polymers by using bacteria that have been genetically modified specifically for the purpose. The succeeding steps involve extracting and purifying the polymers to ensure the final product's quality and consistency. This is done to meet the requirements of the regulatory bodies. Spiber can improve its manufacturing procedures because it uses iterative development cycles, improving the process. This allowed Spiber to achieve its goal of perfecting its manufacturing operations.

### Environmental Benefits

Compared with traditional textiles, materials made with Brewed Protein™ offer significant advantages for protecting the environment. By providing alternatives to materials derived from animals, such as cashmere and wool, fabrics made from Brewed Protein™ contribute to reducing greenhouse gas emissions, water consumption, and difficulties linked to land usage [2]. Additionally, these materials contribute to the reduction of greenhouse gas emissions. In addition, these materials are biodegradable, which indicates that they can naturally disintegrate in marine environments and decompose in the soil, thereby becoming nutrients that contribute to the overall health of the biosphere. This means that they are environmentally friendly.

### Commercial-Scale Production and Sustainable Practices

Both in Thailand and the United States, Spiber maintains fermentation facilities that are capable of producing alcohol on a commercial basis [1]. These plants have been positioned strategically adjacent to agricultural croplands to maximize feedstock availability and minimize transportation emissions. The goal was to reduce the environmental impact caused by the transportation of these emissions. Spiber can guarantee the moral procurement of feedstocks since it collaborates with accredited suppliers and implements only environmentally responsible agricultural techniques. Publishing a Sustainability Impact Report, adopting a Sustainable Sourcing Policy, and collaborating with non-governmental groups and suppliers all demonstrate the corporation's commitment to environmentally responsible

business practices [3]. By taking these measures, we ensure that environmentally responsible policies and procedures are followed throughout the production process.

### Applications and Collaborations

The Brewed Protein™ materials have a wide variety of other possible applications in addition to their use in the textile industry, which is one of those applications. They find applications in a wide range of businesses, such as the construction and transportation sectors and the medical device and artificial hair manufacturing industries. To highlight the potential of Brewed Protein™, Spiber has created strategic collaborations with well-known firms in the fashion industry, such as The North Face, Pangaia, and Yuima Nakazato. These partnerships will allow Spiber to showcase the benefits of Brewed Protein™. As a result of these collaborations, examining new concepts, functionalities, and market possibilities is made feasible, which drives the adoption of sustainable materials across several industries [3].

### Future Outlook

Spiber intends to boost production while cutting costs to make products created with Brewed Protein™ more cost-competitive in the marketplace. The company aspires to expand its presence beyond the confines of the apparel industry and study potential prospects in other sectors of the economy [5]. Once the company has reached commercial success and established mass manufacturing of the product, Spiber anticipates a future in which Brewed Protein™ materials are widely recognized and accepted as environmentally acceptable alternatives in a range of industries all over the world. The continuous investment in research and development and the collaboration with industry partners will further improve and drive the utilization of these ground-breaking materials.

### Conclusion, Future Prospects, Limitations

The production of materials by Spiber that are based on its Brewed Protein™ brand represents a significant step forward in the direction of both the circular economy and the movement of sustainability. The fermentation method is used to produce these materials, which offer alternatives to the standard textiles currently on the market and potentially revolutionize the fashion and textile industries. They ease environmental issues, produce fewer emissions of greenhouse gases, and have a lower water consumption rate in contrast to materials originating from animals, plants, or synthetic chemicals [2]. In addition, they are biodegradable, which means they can be easily recycled. Spiber is in a great position to push the adoption of Brewed Protein™ materials across various industries because the firm possesses both a complete technology platform and a variety of sustainable and flexible materials. This puts Spiber in an excellent position to drive the adoption of Brewed Protein™ materials. The company has established fermentation plants on a commercial scale

in strategic sites near agricultural croplands, with the goals of maximizing the use of available resources and limiting the emissions caused by activities connected to transportation [1]. Specifically, the company aims to maximize the use of available resources to produce alcohol while also minimizing the emissions caused by transportation-related activities. Collaborations with well-established companies have further proved the potential and versatility of Brewed Protein™ materials.

Spiber's plans for the future include raising production while concurrently reducing expenses to make materials made with Brewed Protein™ more price-competitive. The company has goals of increasing its presence in more locations and branching out into industries other than clothing. The future that Spiber sees for itself includes the universal acknowledgement and adoption of Brewed Protein™ materials worldwide. The establishment of mass manufacturing and the attainment of product profitability will allow for the accomplishment of this goal. The performance of the materials will continue to increase due to continued research and development as well as collaborations, both of which will also widen the range of applications that can use these materials.

Even though Brewed Protein™ -based materials offer numerous benefits, some issues remain. Keeping up with the market's expanding demand requires production procedures that are both scalable and cost-effective. Research and development must continue to enhance the materials' performance qualities and discover new uses. Striking a balance between sustainability, scalability, and cost-effectiveness will be crucial for the widespread

use of Brewed Protein™ materials. In addition, Brewed Protein™ materials' success will rely on the market's approval, the industry's general use of the materials, and the removal of any barriers posed by regulations. Education and awareness activities will be required to ensure that consumers and industry recognize the value and benefits of these ecologically friendly alternatives. Despite these limitations, Spiber is a leading alternative for a more sustainable future thanks to its dedication to sustainability, collaborations with major corporations, and ability to produce Brewed Protein™ materials at a commercial scale. By resolving challenges and seizing opportunities for innovation, Brewed Protein™ materials may hasten the shift toward a circular economy and contribute to a more sustainable and ethical society. This can be achieved through fixing problems and paying attention to innovative opportunities.

### References

1. Sekiyama K (2019) Brewed protein: Expanding the range of sustainable materials. *Theworldfolio*.
2. Promostyl (2022) Brewed protein une fibre japonaise issue de la fermentation. *PROMOSTYL Forecast and consulting*.
3. Cumbers J (2020) Keep Warm This Winter With A Sweater Made From "Brewed Protein," The Breakthrough Sustainable Material Inspired By Spider Silk. *Forbes*.
4. Ho S, Ho S, Ho S (2021) This Japanese startup's animal-free 'brewed protein' biomaterials replaces cashmere and wool. *Green Queen - Award-Winning Impact Media - Alt Protein & Sustainability Breaking News*.
5. Castim D (2023) Goldwin and Spiber release Brewed Protein™ fiber collection - *World Bio Market Insights*. *World Bio Market Insights*.



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