



Beyond Insurance:

The Power of Crop Yield Hedges based on Modeled Yield Indices

“Managing yield risk has always been a challenge for our operation. With the Modeled Yield Index, we have finally found a solution which works.”

Carl Deane, CEO Servisur

Introduction

Agricultural production risks, distinct from price risk, have traditionally been viewed as unavoidable acts of nature that must be managed internally within farming operations. Although private risk transfer solutions such as hail insurance are available, significant risks like drought typically require government support in the form of subsidies. The unavailability of these subsidies poses a challenge, especially for large-scale, leveraged producers and investors.

Scenario

Servisur is a privately held producer in Bolivia. Founded in 1994, it is entirely family owned farming more than 50k ha. Servisur's value proposition is to enhance the value of farmland by applying the latest farming and management techniques. Nevertheless, if a severe drought leads to a drastic decline in average soybean yields, falling below 2.4 tons per hectare, Servisur may face significant financial distress, potentially struggling to meet its repayment obligations to input providers, compromising its ability to service its operational loans, and dividend payments to investors. If yields decline further, they may also face significant challenges in covering their fixed costs, which could potentially jeopardize their financial stability and even lead to insolvency.

Challenge

Servisur's owners and board accept earnings volatility, and likewise, their financing partners and input suppliers are confident in their ability to manage farmland effectively. However, preventing weather-related bankruptcy remains a top priority.

Bolivia offers subsidized crop insurance only to small-scale farmers, excluding larger producers like Servisur. Moreover, structuring an individual indemnity policy for the entire operation in the event of a severe drought would involve sampling all fields at harvest, posing logistical challenges and high costs. In addition, insurance companies usually require at least 20 years of yield data to assess farmland's yield volatility and productivity. Servisur cannot provide this data as they are growing their productive area between 5% and 10% annually. Furthermore, historical yields would not reflect the farmland's crop yield potential under Servisur's management and most likely overestimate historical yield volatility.

Thus, even if conventional insurance were available, Servisur would be unable to obtain an adequate coverage that accurately reflects its advanced management and farming capabilities, both in terms of the covered yield potential and at a fair price.

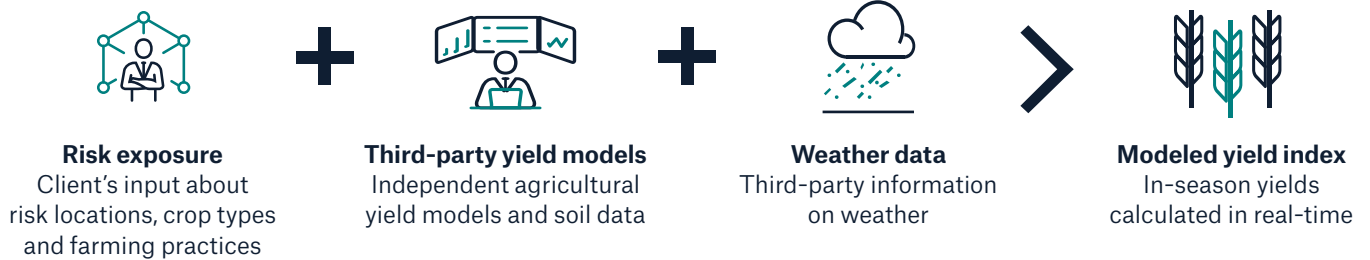
Solution & Benefits

Instead, Servisur, advised by Ceres AI, chooses to hedge its yield risk with Munich Re's *Modeled Yield Index Farmscape*. This is a customized yield hedge, with the underlying being a Modeled Yield Index. The index itself is provided by Praedictus Climate Solutions, an independent crop modeler, index provider, and calculation agent that specializes in operating DSSAT (Decision Support System for Agrotechnology Transfer) yield growth models. The yield index produced by Praedictus uses Servisur's individual field locations, soil data, and crop management practices to simulate crop performance in conjunction with the prevailing local weather conditions during the current season. Together with Ceres AI, Servisur clusters its farmland by risk profile to run a pilot for the 2025 soybean harvest; Servisur decides to buy Munich Re's *Farmscape* solution in the form of a derivative contract that activates at 80% (2.4 tons per hectare) of Servisur's expected soybean yield of 3.0 tons per hectare and caps at 50% yield (1.5 tons per hectare). The hedge cost is 60 US\$ per hectare.

What is a Modeled Yield Index?

A Modeled Yield Index is a simulated measure of crop yield generated using scientific models like DSSAT (Decision Support System for Agrotechnology Transfer), a scientific open-source model. It integrates soil, weather, and crop management data to predict how environmental and management factors influence crop production by simulating plant growth processes which provides a detailed understanding of crop development and yield outcomes. This approach allows for the creation of historical yield data based on current farming techniques and also enables the consideration of more volatile weather conditions in future.

Figure 1: How a Modeled Yield Index is calculated using DSSAT



During the growing season, Praedictus monitors in-season yields and provides weekly reports to enable Servisur to track the index performance. At harvest, Praedictus calculates the final index value within 5 days. If the DSSAT model verifies a yield loss, Munich Re will compensate Servisur within 10 business days.

This bespoke solution offers Servisur an independent, customized yield hedge that ensures prompt payments for liquidity needs and providing the safety net they need to meet their financial obligations to all stakeholders.

Figure 2: Term sheet of Servisur’s Modeled Yield Index solution and its payout for various yield scenarios

Client	Servisur	Final Index* (t/ha)	Payment (US\$)
Location	3000 ha as per Servisur’s shapefiles	3.00	0
Covered Crop	Soybean	2.75	0
Index	DSSAT Soybean	2.50	0
Index Provider	Praedictus	2.25	500,000
Risk Period	Nov 12th 2024 until Apr 30th 2025	2.00	1,333,333
Contract Limit	3,000,000 US\$	1.75	2,166,667
Expected Yield	3.00 t/ha	1.50	3,000,000
Yield Strike	2.40 t/ha (80% of expected Yield)	1.25	3,000,000
Yield Limit	1.50 t/ha (50% of expected Yield)		
Payment per 0.01t yield loss	33,333 US\$		
Cost	60 US\$/ha		

* provided by Praedictus

Conclusion

Crop Yield Hedges, which utilize Modeled Yield Indices, offer tailored yield hedging by considering individual farm-specific risk profiles and management practices. For more information on these innovative solutions, please reach out to the deal team:

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