



Insect Protein

FutureBridge

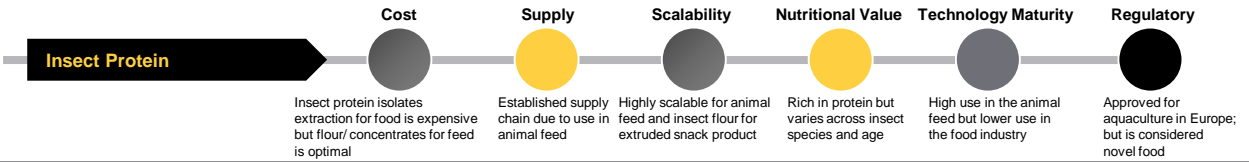
FOOD &
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Insect Protein – Technology Introduction

Insect proteins can be blended with plant and meat protein to provide the higher protein content



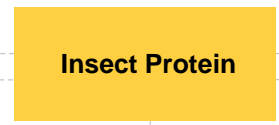
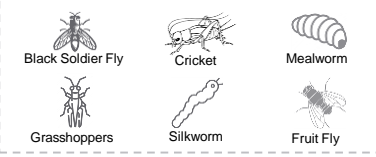
KEY PARAMETERS FOR MARKET ADOPTION

● High ● Moderate ● Low

PATENT ANALYSIS

- **Patents** are observed to be involved in methods to produce **insect-based feed** from **larval stages** of the insects
- The insect can also be used to produce **oil** and **fertilizer**, thereby increasing the **sustainability** aspect of the insect protein
- Patents are observed from both **start-ups** and **established** players such as **Ynsect** and **GEA**
- **Insect farming** has also innovated to include **table-top insect farms** for easier consumer use

INSECTS CONSIDERED



RESEARCH ANALYSIS

- The research in the insect protein segment is **steadily increasing** with an **increased focus** on the use of insect protein in **human food**, **animal** and **pet feed**
- **Research** is focused on the **sensory properties** of **insect-based extruded snacks** and **hybrid meat products**

MARKET ADOPTION

- The insect protein segment holds potential in the **Asian** and **African market** for human nutrition
- The acceptance of the protein in animal feed in **Europe** and the **US** could later lead to greater interest in **human nutrition**
- Established companies such as **Nestlé's** and **ADM** developing products utilizing the **black soldier fly (BSF) protein**

PROS

- **Insect protein** provides high protein content
- It requires **lower food** and **energy** inputs and is an ideal replacement for **animal** and **pet feeds** containing **animal protein**
- **Multiple uses** of insect proteins such as **animal feed**, **oil**, and **fertilizers** increase its **sustainability**
- **Europe** has given approval for insect-based **aquaculture feed**. **Regulation** to be used in fish feed and for **poultry** and **pig feed** is in process

CONS

- **No protein isolate** is currently **available** on **large scale**
- Requirement of **different methods** for **extraction of protein** from **various sources**
- Insect protein is still not accepted in human foods due to its **"yuck factor"** in western countries
- **Insect protein** is considered as a **"novel food"** in **Europe**. **No definite clarity** in the **FDA & EFSA regulations** for food applications

Illustrative Player Ecosystem

Start-up and established players are active in the insect protein segment

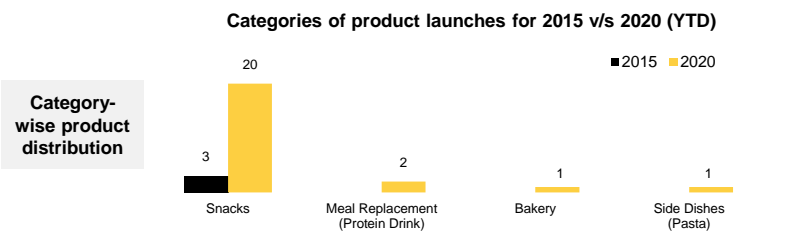
Category	Players
Pet Food	SCOUT2ZOE'S, YORA, Frieda, Entoma, Nestlé PURINA, Ynsect
Animal Feed	INNOV FEED, PROTIX, ENTOCYCLE, Ynsect, CRICKETONE
Human Nutrition	ENTOMO FARMS, EXO, HARGOL, nääk, EAT GRUB, essento

Note: ★ Player produces both wet and dry pet food; Other players produce dry food

Insect Protein – Product Formulation Snapshot (Jan 2015 to Dec 2020)

Insect protein can be raised on low-value agricultural by-products, less land, and water footprint when compared to other alternative protein source and are highly sustainable

Product Formulation Snapshot (Global, Jan 2015 – Dec 2020)

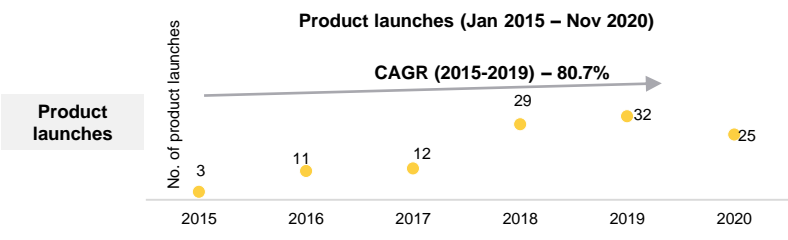


Category-wise product distribution

Top 3 insects
 Cricket, Mealworm, Silk Protein

Top 3 companies
 năak, Entoma, EAT GRUB

Top 3 countries
 Canada, Germany, Thailand



FutureBridge Viewpoint

- The insect protein use in the **human food** and **animal feed segment** is steadily increasing with a **CAGR of 80.7%**
- The **insect protein** is mainly used in the **snacks segment** and is gradually increasing in the **animal feed segment**
- The major **insect proteins** that are utilized include **cricket, mealworm, and silk protein**
- Insect protein** utilizes **significantly less land and water footprint** when compared to other alternative protein source and are highly sustainable
- The upcoming insect protein is **black soldier fly (BSF)**, with established companies such as **Nestlé's** and **ADM**
- The insect protein use is **increasing globally** with a focus on **North America, Europe, and the Asian region**

Illustrative Player Ecosystem

Black Soldiers Fly	
Cricket	
Mealworm	
Grasshoppers	
Silkworm	
Fruit Fly	

Note: Representative player ecosystem. Does not include all players
 Startups produces human nutrition products

Source: Commercial product database and FutureBridge analysis Key: ↑ Compound annual growth rate (CAGR) from 2015 to 2019 Note: YTD – Year to date

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