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Raw material availability for Aquafeeds South Asian perspective

Dr. Raghavendrudu G
Nutreco India

trouw nutrition
a Nutreco company

Why Alternative Raw materials

- Global Fish meals & Marine oils availability? 4.5 million tons of FM 1 Million ton fish oil productivity, and unusual volatility of prices
- Sustainability
- Local competition among the feed producers impacts on profitability
- Climatic changes and El Nino affects
- Overfishing and exploitation of marine recourses (Sardine fish availability?)
- Availability of quality raw materials ?
- Geopolitical and increasing fuel prices
- Regulatory issues (Antibiotics, GMO)
- Changing food habits of the population (Fish and Shrimp in the daily diet)

India Potential

- 8800km long coastline between Western India and Eastern India (Bay of Bengal to Arabian Sea)
- India is the biggest exporter of Vannamei shrimp 0.8 Million metric ton farmed shrimp
- 2.5 Lac Hectares Culture area spread in across India Southern, Western India
- Feed potential 1.2 Million Metric ton Shrimp feed
- Fish feed potential 1.5 million metric ton (IMC Fish Floating& Sinking, Pugnacious, Paku) Majority is Traditional feed 1 Million ton
- 0.6 Million MT IMC Production 60000 ton for Pugnacious
- HVF potential 5000 MT (Growing Mkt) (Murrell, Seabass, Pompano, Grouper)
- Hatchery Feed potential 800MT

Region

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Majority of aqua farms are in south of India

70% of shrimp and 60% of fishes are farmed in the southern provinces

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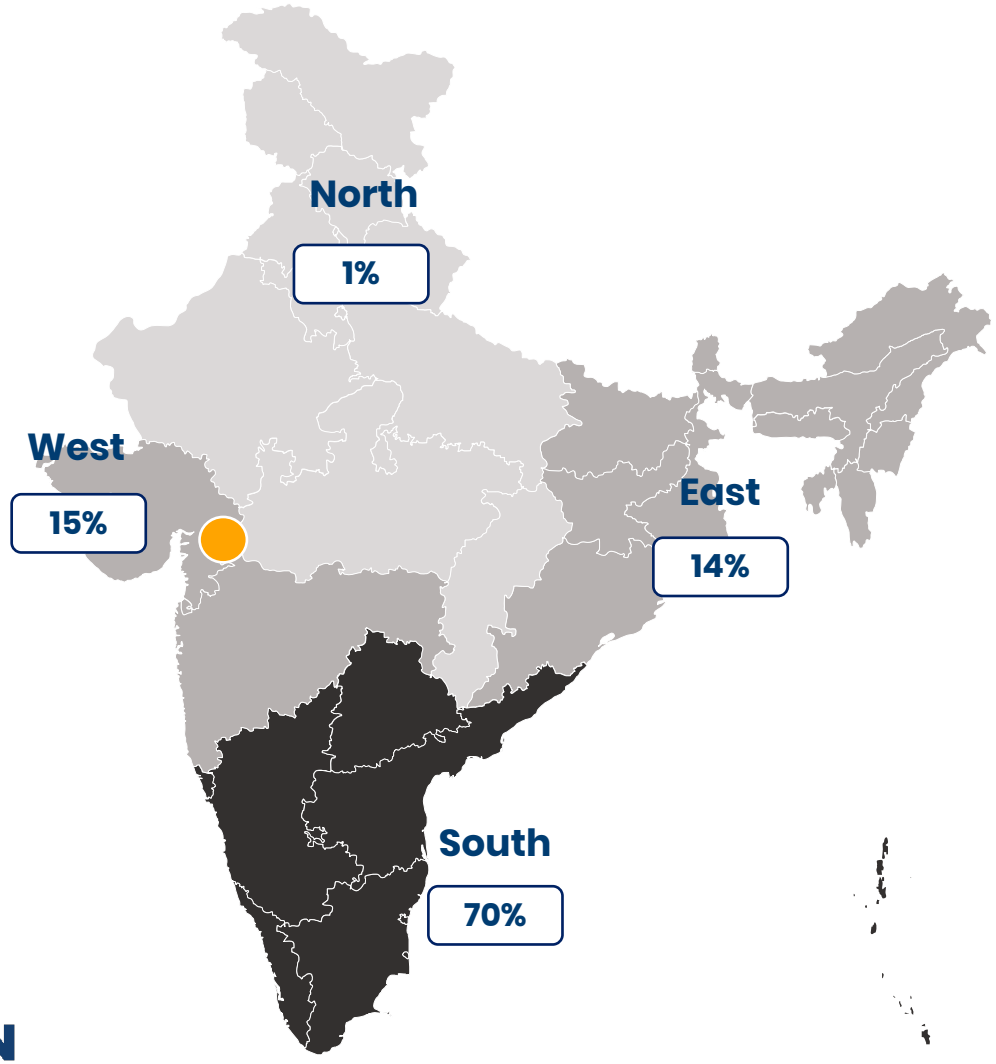
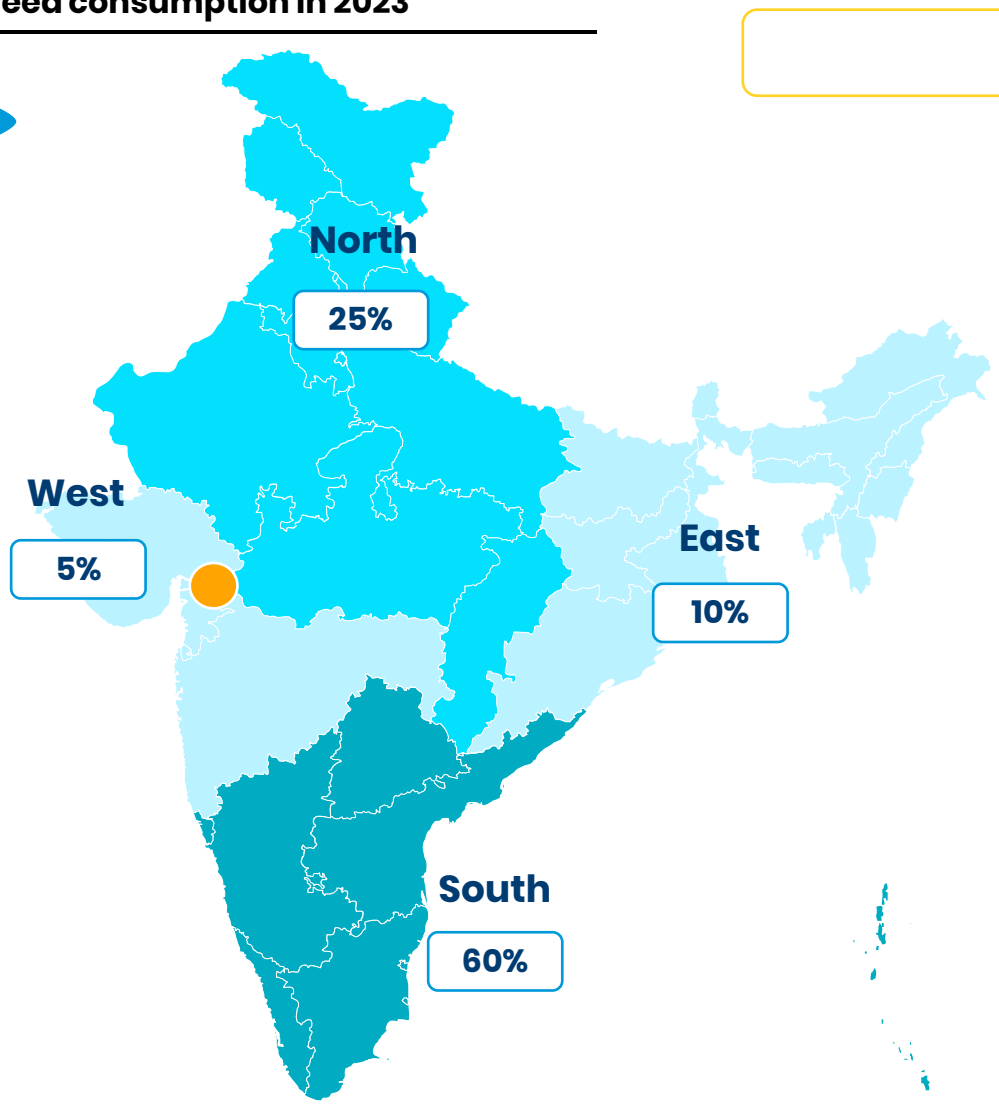
% of shrimp feed consumption in 2023



% of fish feed consumption in 2023



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South Asian perspective

- Huge natural recourses
- High agriculture productivity
- Tropical regions
- Delta regions with long coastlines
- Year long natural river flow (Ganges, Indus, Brahmaputra, Krishna, Godavari)
- Wide range of climatic conditions
- Availability of raw materials (Plant based and animal based)
- Import and export regulations
- Year long availability of Agri inputs
- Economic growth (Each year min 5 to 7%)
- More than 3 million Metric Ton Aqua feed production(Fish & Shrimp)

Composition of Nutrients in Feed (South Asia)

S.No	Species		Protein		Fat	Fibre	Moisture
		PL/Fry	Juvenile	Adult			
1	Shrimp	45-38%	42-38%	38-36%	6%- 8%	4%	10%-11%
2	Carps	40-32%	28-26%	24%-20%	4%	6%	10%
3	Cat fish	35-32%	30%	28%-26%	5%	4%	10%

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Feed Physical Specification

Colour	Medium and Dark
Size variation	5%
Floating	zero
PDI	95%
Stability	90 Min
Fines	1%

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Raw materials

Mustard Meal

- It's available all year with protein content of 35% with ideal amino acid profile
- Up to 5% inclusion recommendable
- 0.3 USD per kg 12.64 MT productivity in India
- More inclusion leads impact on Pellet colour as well as palatability
- Anti nutritional factors and fibre content.

Ground nut meal

- availability more with protein 40-45% and widely used in aqua feeds
- Inclusion up to 5-8%
- 0.4 USD price 99.70 MT productivity in India
- Pellet shining and improves PDI
- Aflatoxins are the major constraints
- Grinding and Pulverising depends on brittleness of the oil cake

cont

Broken rice

- Highly available protein ranges from 8-10% as well as good carbohydrate sourse.
- 0.25 USD per kg 120 MT availability per year in India
- Inclusion levels fish 15% as well as shrimp 3-4%
- Higher inclusion may leads to air bubble formation in the pellet that leads t floating
- Low aflatoxin level

DORB (De oiled Rice Bran)

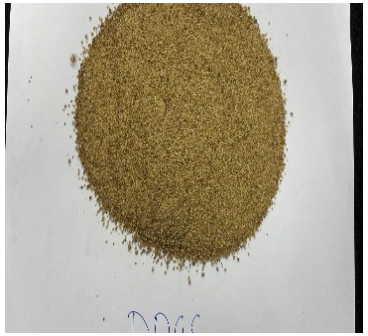
By product in Rice milling it contains 13% to 16% protein and 2% Fat it used as filler in fish feeds up to 10-20% recommendable inclusion

High fibre content , Sand and silica, rough ness of the pellet surface impacts on extruder performance

Rice Gluten : Protein ranging from 50-55% and recommendable 4% inclusion available at 0.6USD kg

Cons : Colour of the feed and Floating (Shrimp) in cooking process high temperatures leads to charred colour of the pellets

DDGS (Dried Distillers Grains soluble) Rice &Corn



- By Product in ethanol and alcoholic beverage industry rice sourse of protein
- 35-45% with good digestibility and ideal amino acid profile and improves the performance of the feed
- 0.3 USD per kg 4.11 MT availability year
- Usage : 4-8% shrimp and 10% fish feed formulation
- Avoid high temperatures in cooking process it leads to charring of the pellet as well as palatability issues
- Moisture and Aflatoxins

Guar Meal :

- Protein ranging from 50-55% Fibre 5-7% good sourse of protein widely used in Fish , it doesn't contain trypsin inhibitor.
- Usage : 5-8% inclusion
- 0.6 USD per kg 0.25MT availability India
- Improves pellet binding capacity and PDI values
- Cons : Palatability and colour of the feed

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Insect Proteins

Silk Worm protein:

Rich sourse of protein 50-55% and fat Min 10% and ideal amino acid profile

Recommendable inclusion 4-6%

1.2 USD per kg availability is very less

Cons : High Moisture , Drying and processing required , Scalability, Palatability

Black soldier fly meal still infancy in South Asia

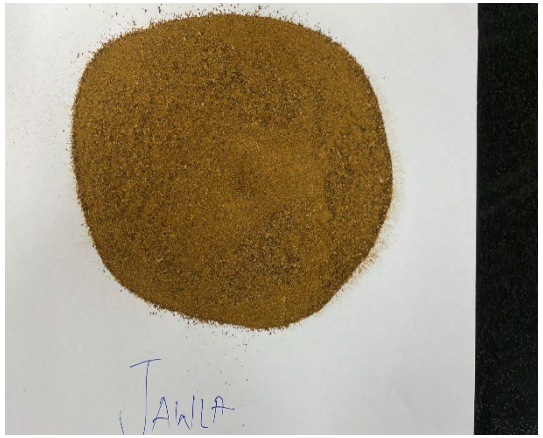
Alternative Marine proteins

Fish Trimming Meals:

- By product of fish processing protein ranging from 45-50% and rich amino acid profile with good palatability
- Inclusion 4-6% 1 USD per kg
- Higher inclusion may leads reduce PDI value and Dust content in feed
- Cons : High ash , seasonal availability,

Shrimp Head meal/ Jawla meal

- Protein ranging from 35 -40% and its by product in shrimp processing
- Jawla meal is tiny dried form of small shrimps available as bi catch protein ranging 35 to 45% CP
- Inclusion 4-8 % for fish and gives high palatability 0.6 USD per kg
- Digestibility and BAP , Sand silica, seasonal availability



Alternative Fish Oils

Soya oils

- Rich sourse of fatty acids like PUFA and MUFA and free from toxicants and replace with fish oils
- 1.5MT availability and 1.2 USD per litre available in Crude as well as Refined form
- 5 % inclusions is recommended depends on species (Fish/Shrimp)
- Cons : palatability

Rice bran oil

- Rich sourse of Antioxidants , PUFA and MUFA
- 1.05 MT available in India 1USD per litre
- 6% inclusion recommendable depends on species (Fish) more inclusion leads to
- Increase of rancidity and impacts on palatability

Algal oils : Infancy in South Asia

Summary

- Raw material availability
- It doesn't change the nutritional values
- Ecofriendly
- It won't effect the performance of the feed
- Economical and Affordable
- Sustainable utilization
- Biodiversity

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