

Assessment of fishmeal and fish oil processing industry in India

March 2022

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1 Macroeconomic overview of India

1.1 A review of India’s GDP growth

GDP grew at 6.6% CAGR from fiscals 2012-20

In 2015, the Ministry of Statistics and Programme Implementation (MoSPI) changed the base year for calculating India’s GDP between fiscals 2005 and 2012. Based on this, the country’s GDP increased at an eight-year CAGR of 6.6% to Rs 146 trillion in fiscal 2020 from Rs 87 trillion in fiscal 2012.

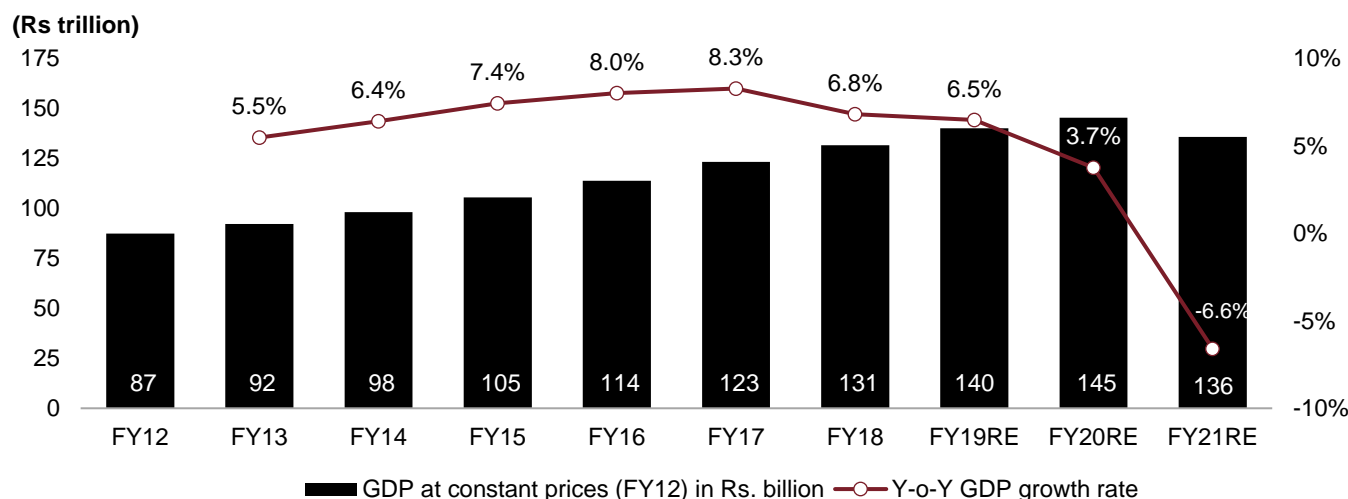
Fiscal 2021 has been a challenging year for the Indian economy, which was already experiencing a slowdown before the pandemic struck. GDP contracted 7.3% (in real terms) last fiscal, after growing 4.0% in fiscal 2020. At Rs 136 trillion in fiscal 2021, India’s GDP (in absolute terms) went even below the fiscal 2019 level of Rs 140.0 trillion.

Economy re-bounded in second half of fiscal 2021 after shrinking in first half of the year, recovery continues in fiscal 2022

After contracting in the first half because of a virulent second wave of Covid-19, the economy rebounded in the second half, growing 0.7% and 2.5% on-year in the third and fourth quarters, respectively during fiscal 2021. While the economy shrank as a whole in fiscal 2021, agriculture and allied activities, and electricity, gas, water supply and other utility services were the outliers, logging positive growth. On the other hand, contact-intensive trade, hotels and transport sectors, and services related to broadcasting were hit the most, and continued to shrink in all the quarters. Construction – a labour-intensive sector – was also severely hit in the first half but rebounded in the second half.

The economy is in recover mode, with GDP expanding 20.3% on-year in the first quarter of fiscal 2022 and 8.5% on-year in the second quarter of fiscal 2022. In absolute terms GDP for the second quarter of fiscal 2022 has just crossed the GDP value reported in first quarter of fiscal 2020 (pre-covid). The economic rebound comes on the back of reduced pandemic restrictions and improving vaccination coverage.

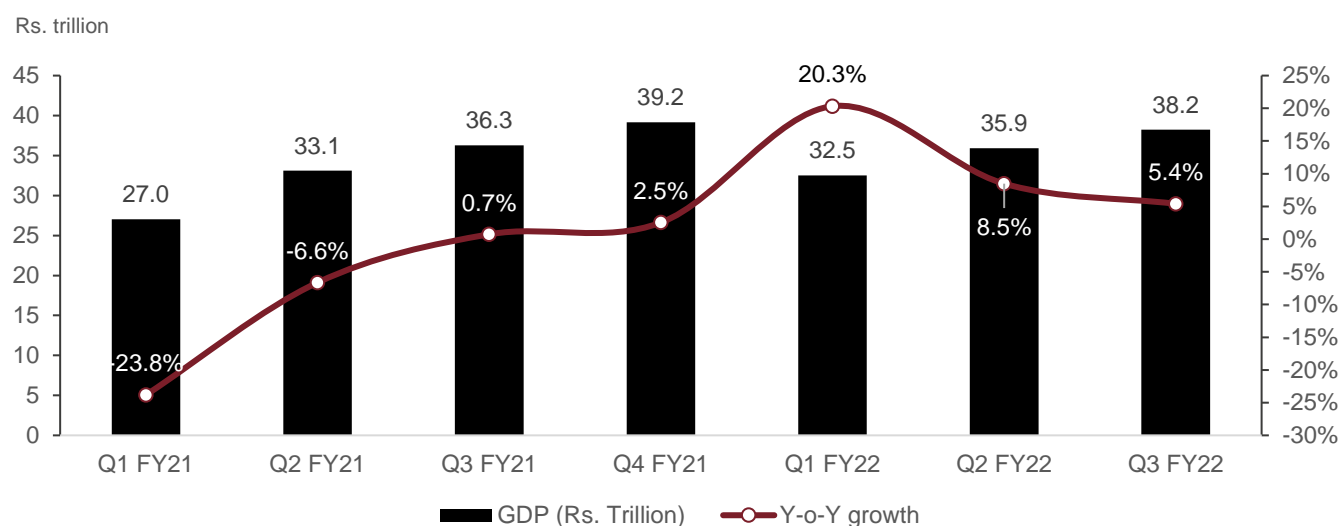
Real GDP growth in India (new GDP series)



PE: Provisional estimates, RE: Revised estimates

Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), CRISIL Research

Quarter-wise real GDP growth in fiscal 2021 and fiscal 2022



Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), CRISIL Research

From a supply side perspective, i.e. gross value add (GVA), a much clearer measure of the economy's performance for last fiscal emerges. Based on this metric, the economy shrank by 4.8% (compared with 3.8% growth in fiscal 2020). In absolute terms, real GVA was Rs 125.9 trillion last fiscal, down from Rs 127.3 trillion in fiscal 2019.

Gross value added (GVA) at basic prices (constant 2011-12 prices)

Rs trillion	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	FY22AE	CAGR
GVA at basic prices	81.1	85.5	90.6	97.1	104.9	113.3	120.3	127.3	132.2	125.9	136.2	5.0%
Y-o-y growth (%)		5.4%	6.1%	7.1%	8.0%	8.0%	6.2%	5.8%	3.8%	-4.8%	8.3%	

RE: Revised estimates AE: Advanced estimate

Note: CAGR is between fiscals 2012 and 2021

Source: CRISIL Research

1.2 Outlook for GDP growth in India

Fiscal 2022 base case GDP growth expected to be 8.9%

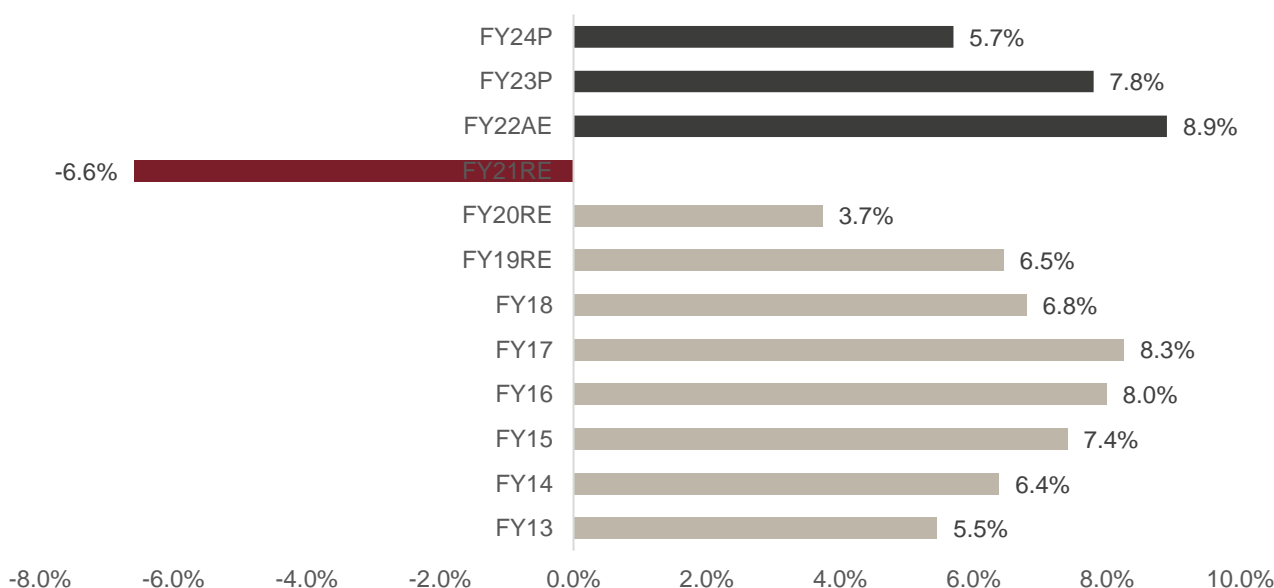
India is getting back on its feet slowly, with divergent growth trends. Though data suggests there has been some pick-up in recent months, recovery is weak and uneven. And indeed, the scars of the pandemic continue to run deep for small businesses, the urban poor and most of the services sector.

Fiscal 2022 is also seen emerging as a story of two halves. The first half will be characterised by a base effect-driven recovery amid the challenge associated with resurgence in Covid-19 infections. But the second half should see a more broad-based growth, as vaccine rollout and lesser nationwide restrictions support sectors that are lagging. The gains made by the economy in the fourth quarter of fiscal 2021 seem to have fizzled out in the first quarter of fiscal 2022 because of the fierce second wave of Covid-19, leading to localised lockdowns in most states. At the same time, monetary policy has begun normalising, and some tightness in domestic financial conditions is inevitable. Against this backdrop, policy support remains critical, apart from action in the external environment.

In fiscal 2021, the policy response to the pandemic focused more on damage control and measures to support the economy. In the current fiscal, the government is expected to normalise some of the extraordinary or unconventional policy moves, while trying to ensure there is smooth revival in growth. This will pertain to most of the services sectors, especially contact-based travel, tourism and entertainment. Also, stronger global growth should support India's exports to some extent. Revival will not be uniform across sectors, though. So far, the rural economy has been more resilient than the urban.

With the third wave of Covid-19 (with minimal economic impact) behind us, CRISIL Research expects fewer supply disruptions from covid-19 and a fuller resumption of services activity in the coming fiscal. As a result, contact-intensive services, which still trail the pre-pandemic levels of fiscal 2020, could start contributing favourably to growth. But slower global growth and high commodity prices, especially that of oil, could put downward pressure on growth. Heightened geopolitical risks from the Russia-Ukraine conflict, which continues to intensify, could add more headwinds. Considering this, CRISIL estimates real GDP growth projection for fiscal 2023 at 7.8%, with downside risk.

Real GDP growth (% on-year)



RE: Revised estimates; AE: Advanced estimates P: Projected by CRISIL Research

Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), CRISIL Research

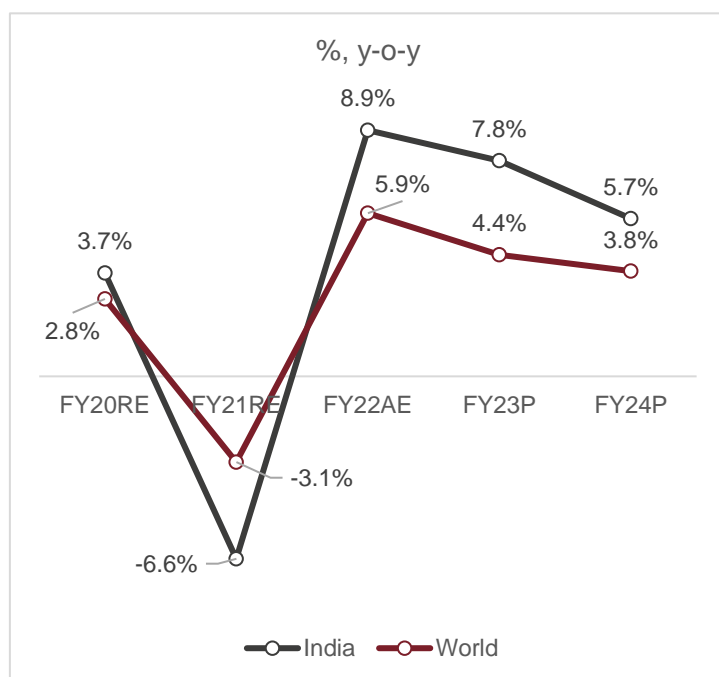
CRISIL forecasts India's GDP growth to rebound to 8.9% in fiscal 2022 as following drivers converge:

Weak base: A 6.6% contraction in GDP in fiscal 2021 will provide a statistical push to growth next fiscal.

Global upturns: Higher global growth in 2021, i.e., world GDP up by 5.9%, advanced economies 5.0%, emerging economies 6.5%, should lift exports.

Fiscal push: Stretch in the fiscal glide path and focus of the Union Budget 2021-22 on capex are expected to have a multiplier effect on growth.

India to surpass global GDP growth in next three fiscals



GDP growth to rebound to 9.2% this fiscal on the back of a very weak base and the rising-global-tide effect

CRISIL sees India's GDP growth rebounding to 9.2% this fiscal due to a very weak base, flattening of the Covid-19 curve, rollout of vaccinations, investment-focused government spending, and benefit from the 'rising global tide lifts all boats' effect. Yet, the economy is expected to reach pre-pandemic levels only by the second quarter of this fiscal. Services will take longer to recover than manufacturing. Beyond fiscal 2022, India is seen growing faster than the world. Over fiscals 2023-25, growth is seen averaging at ~6.0% annually.

Note: Forecasts for World are for calendar year; FY20 corresponds to 2019 and so on; RE: Revised estimates; AE: Advanced estimates P: Projected; updated as of Jan 2022; India numbers for FY20, FY21 and FY22 are based on MoSPI's latest GDP estimates and FY23 onwards are CRISIL Research's forecast. World GDP growth rates are from IMF world economic outlook update as of January 2022.

Source: S&P Global Ratings, CRISIL

India is expected to regain the top spot as the world's fastest growing economy in 2021

India was one of the fastest-growing economies in 2018 and 2019. In 2020, the GDP of all countries – including that of developed ones such as the US and the UK but except China's had de-grown, primarily due to the impact of the pandemic. India's GDP declined 7.3% in 2020. Further, the GDP growth of all major economies has rebounded in 2021 as economic activities resumed and also due to the low base of 2020. Among the major economies, India, with a growth rate of ~9 %, was the fastest-growing in 2021, followed by China with 8.1%.

Asia-Pacific has been hit hard by the pandemic and is recovering from a severe recession. The outlook varies by country depending on infection rates and containment measures, policy responses, reliance on contact-intensive activities, and external demand. Output is expected to remain below pre-pandemic trends over the medium term, with the most vulnerable in society likely to be hit the hardest. The projections remain highly uncertain, with significant downside risks. The Asia-Pacific region is also starting to recover tentatively, but at multiple speeds. Economic activity in emerging and developing Asia is expected to contract by 1.0% in 2020, due to a sharper-than-expected downturn in key emerging markets, and to grow by 8.6% in 2021 and 6.0% in 2022

Real GDP growth by geographies

	2017	2018	2019	2020	2021	2022P	2023P
United States	2.3	3.0	2.2	-3.4	5.6	4.0	2.6
Euro area	2.6	1.8	1.3	-6.4	5.2	3.9	2.5
Japan	2.2	0.3	0.3	-4.5	1.6	3.3	1.8
United Kingdom	1.2	1.3	1.4	-9.4	7.2	4.7	2.3
China	6.9	6.7	5.8	2.3	8.1	4.8	5.2
India	6.8	6.5	4.0	-7.3	9.0	9.0	7.1

	2017	2018	2019	2020	2021	2022P	2023P
ASEAN	5.3	5.3	4.9	-3.4	3.1	5.6	6.0
Middle East and Central Asia	2.6	2.1	1.4	-2.8	4.2	4.3	3.6

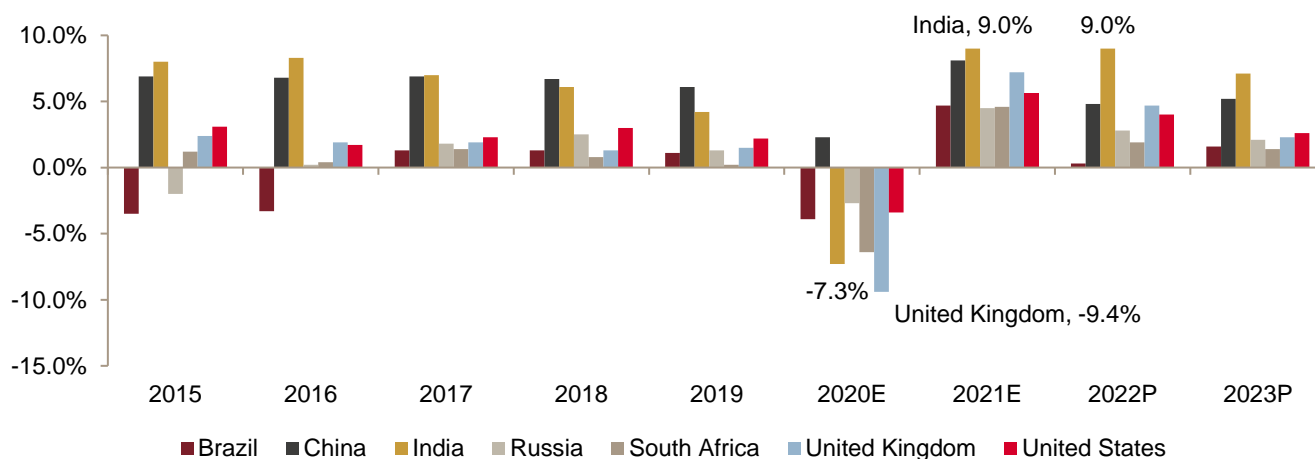
P: Projection as per IMF update

*-Numbers for India for year 2020 onwards are for financial year (2020 is FY21 and so on) and as per IMF forecast. CRISIL Research forecast for FY21:-6.6% and FY22: 8.9%,FY23: 7.8%

Emerging Asia comprises the ASEAN-5 (Indonesia, Malaysia, Philippines, Thailand, Vietnam) economies, China, and India.

Source: IMF economic database, World Bank national accounts data and OECD national accounts data, CRISIL Research

Trend of real GDP growth rate (%) for major economies (2015-23P)



Note: Data for India represents financial year, forecasts for India are IMF forecasts and forecasts are presented on a fiscal year basis for India CRISIL Research estimates India's GDP to grow at 9.2% in FY22 and 7.8% in FY23

Source: IMF, CRISIL Research

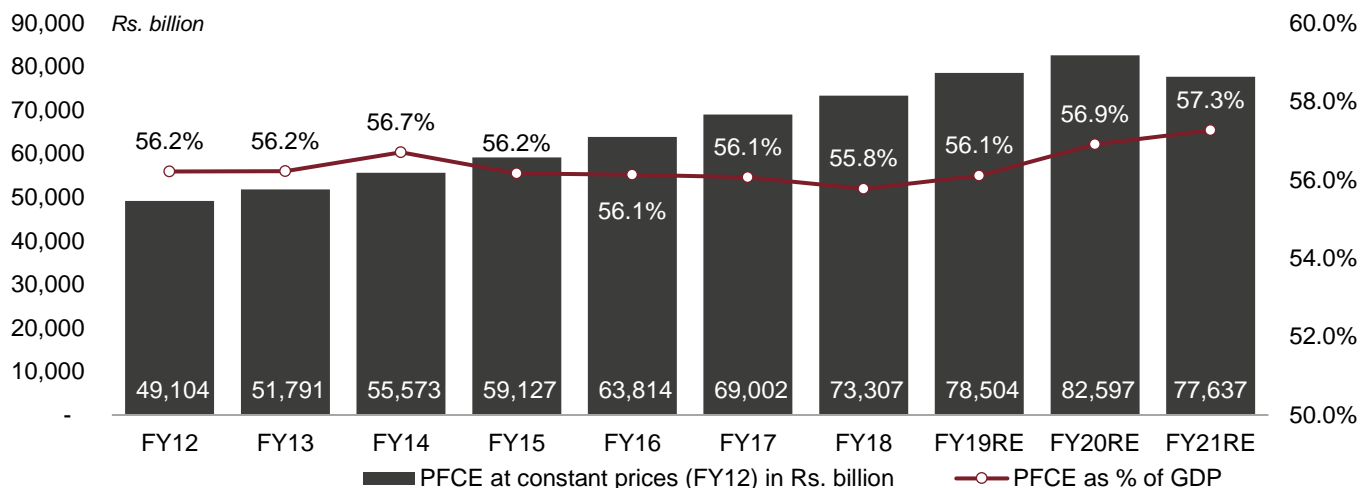
Key fiscal measures announced by the Centre to deal with the pandemic's impact

To mitigate the pandemic's negative impact on the economy, the Central government has announced a Rs 20.9 trillion package, amounting to 10% of the country's nominal GDP. The package is a mix of fiscal and monetary measures (to revive growth in the short term) and reforms (to boost long-term economic prospects). Liquidity support has been a major part of India's response so far. Globally, too, liquidity measures have played a lead role in policy response. The immediate fiscal cost to be borne by the government would be ~Rs 2.6 trillion, or 1.2% of nominal GDP. Further, execution of the government's measures to revive the economy and pace of implementation of the announced reforms are key monitorables.

1.3 Review of private final consumption growth in India

Private final consumption expenditure to maintain dominant share in GDP

Private final consumption expenditure (PFCE) at constant prices clocked 6.7% CAGR between fiscals 2012 and 2020, maintaining its dominant share in the GDP pie, at ~57% or Rs 82,597 billion. Factors contributing to the growth included good monsoons, wage revisions due to the implementation of the Pay Commission's recommendations, benign interest rates, and low inflation. PFCE declined in fiscal 2021 to Rs 77,637 billion on account of the pandemic, where consumption demand was impacted on account of strict lockdown, employment loss, limited disposable spending, and disruption in demand-supply dynamics.

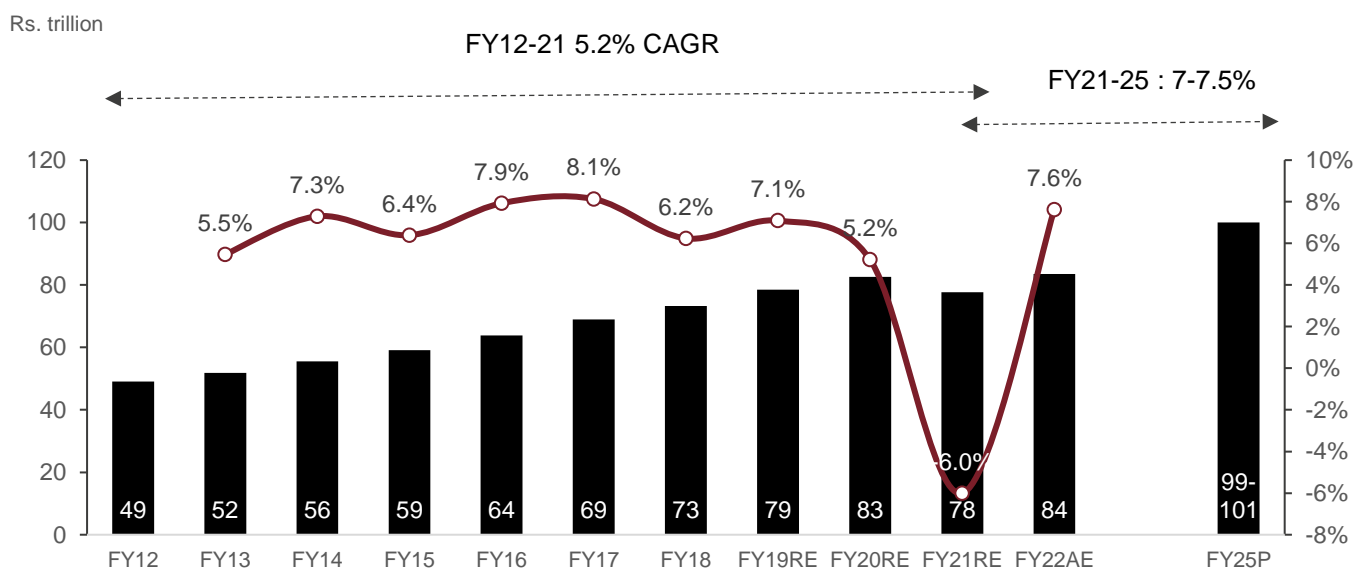


PFCE to clock 7-7.5% CAGR between fiscals 2021 and 2025

PFCE at constant prices registered 5.2% CAGR between fiscals 2012 and 2021, maintaining its dominant share in the GDP pie at 57.3% or Rs 77.6 trillion in fiscal 2021. PFCE declined in fiscal 2021 to Rs 77.6 trillion on account of the pandemic, where consumption demand was impacted on account of strict lockdowns, employment loss, limited disposable spending, and disruption in demand-supply dynamics.

Going forward, CRISIL forecasts PFCE to grow at 7-7.5% CAGR between fiscals 2021 and 2025. Factors contributing to the growth include good monsoons, wage revisions due to the implementation of the Pay Commission's recommendations, benign interest rates, and low inflation.

PFCE (at constant prices)



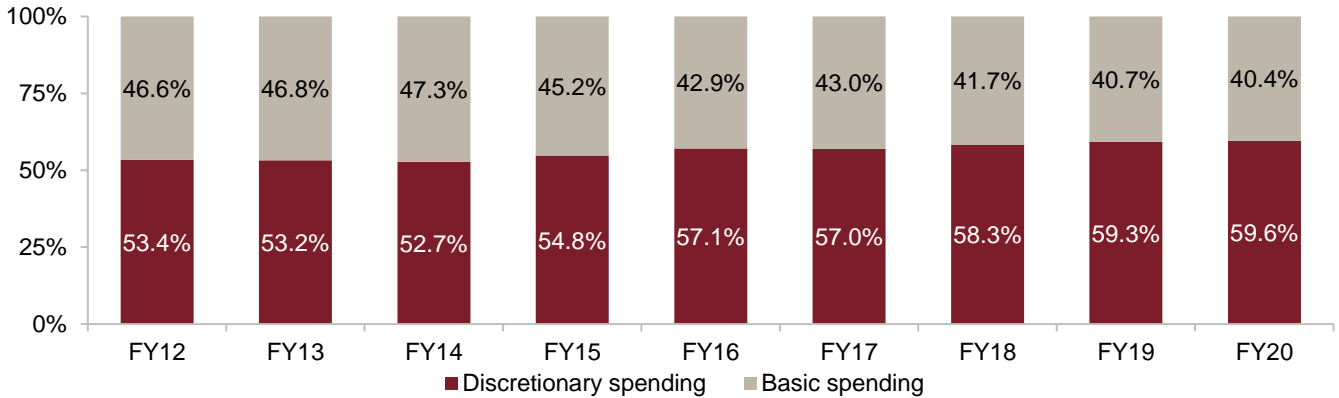
AE: Advanced estimates; P: Projections by CRISIL

Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), CRISIL Research

Consumption expenditure to be driven by discretionary items

According to CRISIL Research, basic items accounted for 40.4% of the total consumption expenditure of Indian consumers in fiscal 2020, with discretionary items accounting for the remainder 59.6%. It is worth noting that the share of discretionary items in consumption increased to 59.6% in fiscal 2020 from 53.4% in fiscal 2012. The increased spending on discretionary items suggests rising disposable income of households.

Broad split of PFCE consumption into basic and discretionary spending

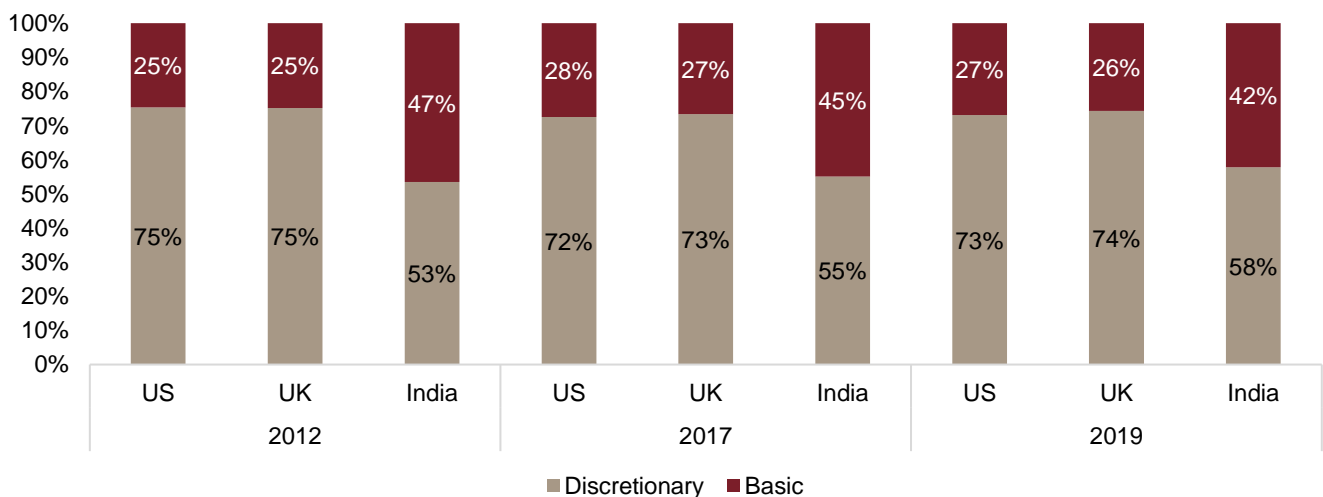


Note: Basic items include food, clothing and housing. Discretionary items include education, healthcare, electricity, water supply, footwear, personal care products, processed foods, alcoholic and non-alcoholic beverages, tobacco, narcotics, fuel and gas, furnishing and household equipment, vehicle and personal transportation, spending on recreation and culture, communication, restaurants and hotels, financial insurance and other financial services, and other items not elsewhere classified (n.e.c.)

Source: MoSPI, CRISIL Research

India's discretionary spending is lower than that of advanced economies, such as the US and the UK, and is expected to grow with a rise in per capita income. In 2012¹, discretionary items accounted for ~75% of spending for both the US and the UK compared with ~53% for India. The share increased for the US, the UK, and India to ~76%, 77%, and 55% in 2017, and further changed to 73%, 74%, and 58%, respectively, in 2019. As the Indian economy advances and household disposable income rises, the share of discretionary spending is expected to increase further and drive overall consumption expenditure.

Consumption pattern breakdown: India, the US, and the UK



Notes:

- CRISIL Research has used consumer/household spending data (the US and the UK) and PFCE data (India) to arrive at the broad split into discretionary and basic items, as defined earlier.
- Data for the US is for calendar years 2011, 2016, and 2018, and for the UK and India is for fiscals 2012, 2017, and 2019.

Source: MoSPI, Office of National Statistics – UK, Bureau of Economic Analysis – US Department of Commerce, CRISIL Research

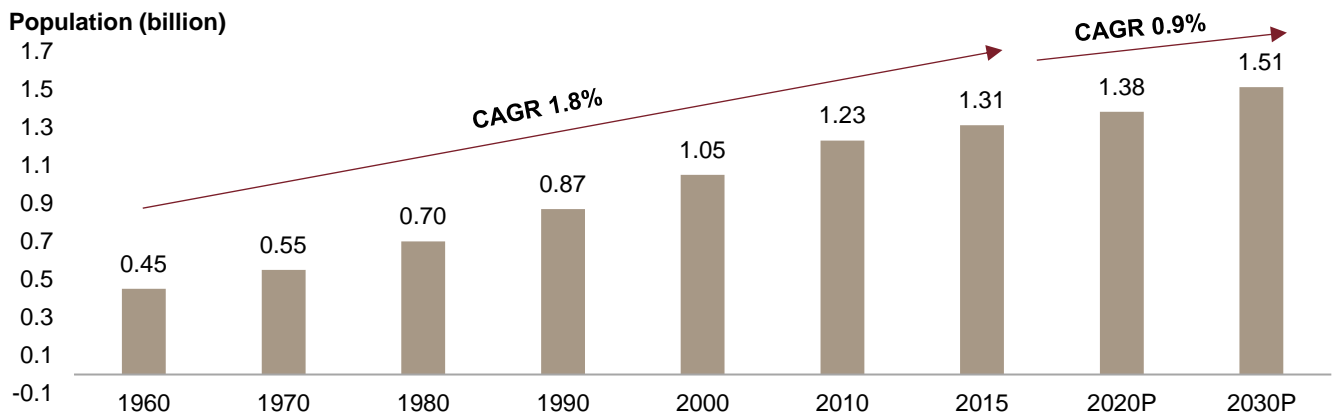
1.4 Fundamental GDP growth drivers

India’s population projected to reach 1.5 billion by 2030

India’s population increased at a CAGR of 1.8% during 2001-2011 to ~1.2 billion according to Census 2011. As of 2010 census, the country had about 246 million households.

According to the UN’s report, *World Urbanization Prospects: The 2018 Revision*, India and China, two of the most populous countries, accounted for nearly 37% of the world’s population in 2015. The report projects India’s population to increase at a CAGR of 1% to 1.5 billion by 2030, making it the world’s most populous country, surpassing China (for which the projected population is 1.4 billion).

India’s population growth



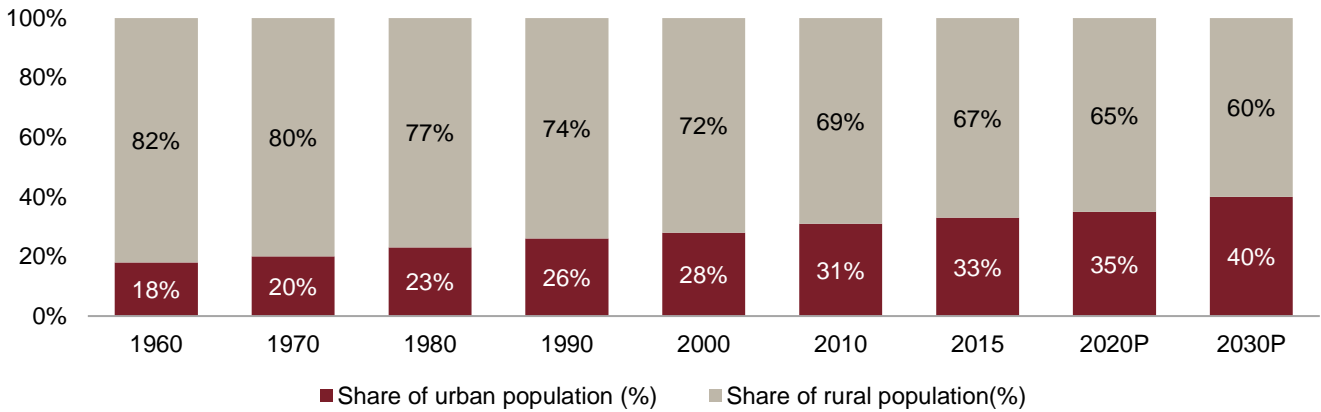
P: projected

Source: *World Urbanization Prospects: The 2018 Revision*, the UN, CRISIL Research

Urbanisation likely to reach 40% by 2030

India’s urban population has been rising over the years and stood at ~31% of total population in 2010. The rising trend is expected to continue. The UN report has projected that nearly 40% of the country’s population will live in urban areas by 2030.

India's urban versus rural population



P: projected

Source: World Urbanization Prospects: The 2018 Revision, UN, CRISIL Research

People from rural areas move to cities for better job opportunities, education, and quality of life. The entire family or only a few individuals (generally an earning member or students) may migrate, while the other members continue living in rural house.

India's population median age to reach 31.4 years by 2030

According to the UN, the global median age rose to ~30 years in 2015 from ~22 years in 1970. The median ages in developed countries exceeded the global median age significantly, as is evident from the median ages in the US and the UK, which were 39.8 years and 42.4 years, respectively. Interestingly, India's median age was significantly lower at 28.2 years, indicating a favourable demographic dividend. Furthermore, India's median age was the lowest even among Brazil, Russia, India, and China (BRIC), with Brazil, China and Russia recording median ages of 31.3 years, 37.0 years, and 38.7 years, respectively.

This trend is expected to continue up to 2030, implying strong potential for an increase in income, and basic and healthcare spending, with a growing proportion of the population engaging in employment activities.

Trend in median ages across key countries

Country	1970	1990	2010	2015	2020P	2030P
Brazil	18.7	22.4	29.0	31.3	33.5	37.7
China	19.3	24.9	35.2	37	38.7	43.0
India	19.4	21.1	25.1	26.7	28.2	31.4
Russian Federation	30.8	33.4	38.0	38.7	39.6	42.6
UK	34.2	35.8	39.6	40.2	40.8	42.4
US	28.4	32.8	36.9	37.6	38.3	39.8
World	21.5	24.0	28.5	29.6	30.9	33.0

P: projected

Source: UN population estimates, CRISIL Research

India's per capita income rose at a healthy pace between fiscals 2012 and 2020

India's per capita income, a broad indicator of living standards, rose from Rs 63,462 in fiscal 2012 to Rs 94,270 in fiscal 2020, at 5.1% CAGR. This growth was led by better job opportunities, propped up by overall GDP growth. Moreover, population growth remained fairly stable at ~1% CAGR. However per capita income declined in fiscal 2021 owing to economic impact of Covid-19, per capita income declined by 9.7% on-year in fiscal 2021.

Per capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20RE	FY21RE	FY22AE
Per-capita net national income (Rs)	63,462	65,538	68,572	72,805	77,659	83,003	87,586	92,133	94,270	85,110	91,723
On-year growth (%)		3.3	4.6	6.2	6.7	6.9	5.5	5.2	2.3	-9.7	7.8

RE: Revised estimates; PE: Provisional estimates; AE: Advanced Estimates

Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), CRISIL Research

The decline in poverty levels indicates rise in middle- and high-income group in India

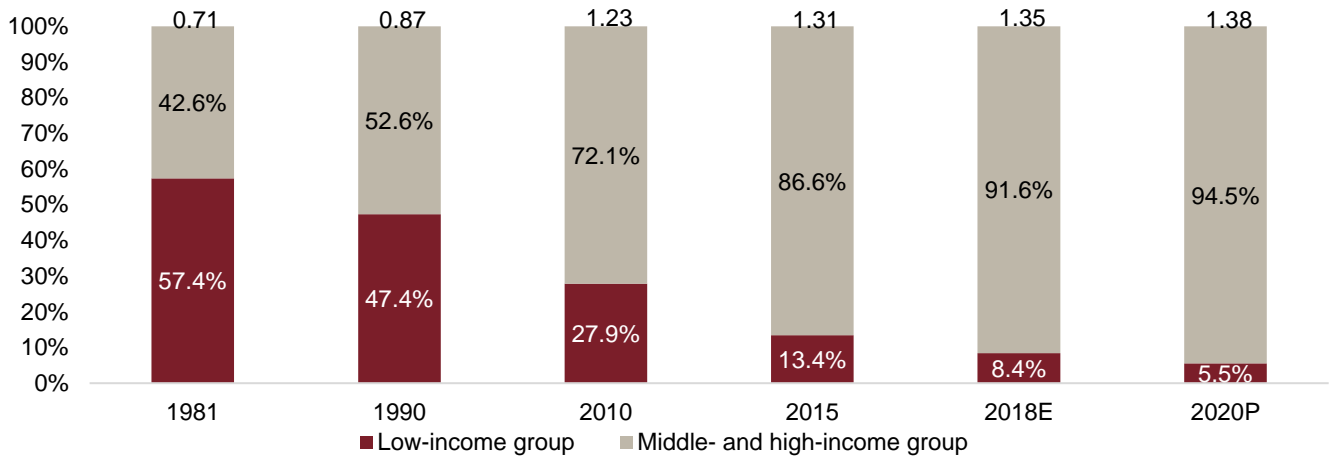
The World Bank, in its report 'Global Economic Prospects, January 2019', had estimated the number of poor (defined as those living at or below the international poverty line of purchasing power parity of \$1.90 per day) in India to decline sharply to 175 million people in 2015 from 405 million people in 1981. The share of poor in India's total population declined to ~13.4% over the period from 57.4%, and was estimated to be 8.4% in 2018. The decline in poverty has been attributed to an improvement in macroeconomic parameters, such as growth of the economy, employment rate and income equality, and adoption of employment and other public welfare schemes by the government.

The World Bank had projected the absolute number of poor in India to reduce to ~77 million people in 2020, thereby lowering the share of poor to ~5.5%.

The decline in the share of poor in total population indicates that the middle- and high-income group in India grew rapidly to 86.6% in 2015 from 42.6% in 1981, and was expected to reach 94.5% by 2020. A positive economic outlook, along with growth across key employment-generating sectors, such as real estate, infrastructure, and automobiles, is expected to have a cascading effect on overall per capita income levels of the population in the medium-to-long term. This, in turn, is expected to drive consumption expenditure and healthcare basic and discretionary spending.

Population categorised by income groups

(Share in %)



E: estimated, P: projected

Notes:

- The values bar column indicates the total population in billion for respective years as per UN population estimates.
- The World Bank defines poor as those living at or below the international poverty line of purchasing power parity of \$1.90 per day. Data for 2018 is estimate and data for 2020 is projection and calculated using data from the World Bank (2018).
- The low-income group includes the proportion of the population earning less than or equal to \$1.90 per day; the middle- and high-income group includes the proportion of the population earning more than \$1.90 per day.

Source: World Bank, CRISIL Research

1.5 Review of Consumer Price Index (CPI) in India

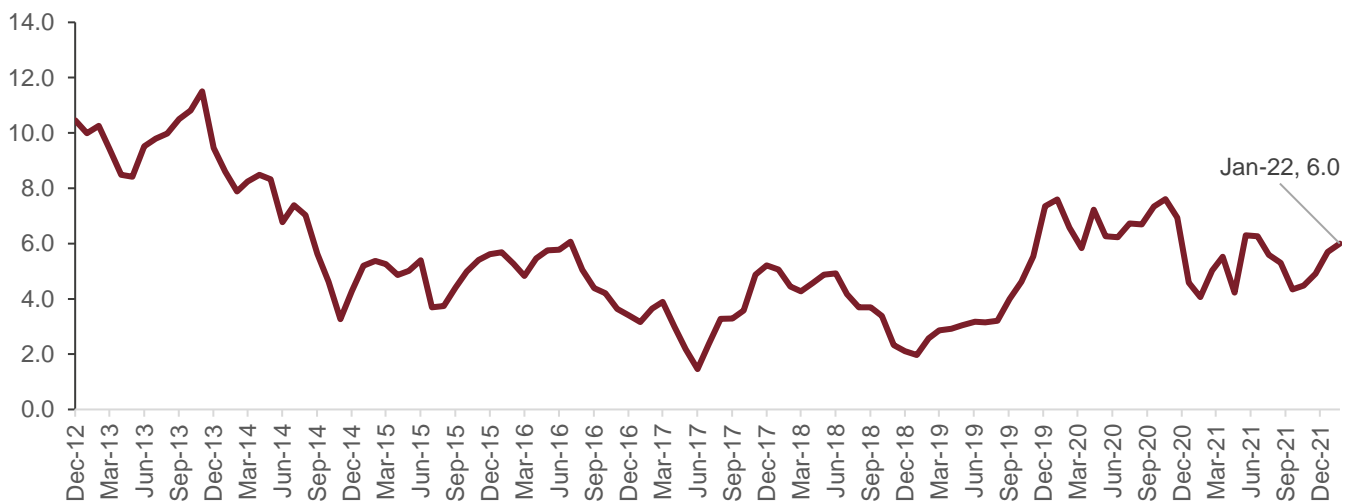
Inflation based on consumer price index (CPI) rose for the fourth consecutive month to 6% in January compared with 5.7% December 2021 and 4.1% in January 2021. On a sequential basis CPI has grown at 0.5% on-month during the January month similar to trend seen in past two months.

Headline inflation is now at the upper limit of Reserve Bank of India's target range of 2- 6%. A 'base effect driven' sharp rise in food inflation drove the rise in CPI, even as core CPI inflation (CPI excluding food and beverages and fuel and light) remained elevated.

Led by the rise in important food items such as cereals, vegetables and milk among others, food and beverage price inflation almost doubled to 5.4% Y-o-Y growth compared to 4% Y-o-Y growth during the previous month. However, the fuel inflation has eased falling below 10% supported by the slow growth in Liquid Petroleum Gas (LPG) prices coupled with decline in electricity prices. In addition, at its most recent meeting, the RBI decided to maintain its accommodative monetary policy going into 2022.

CPI in India

Y-o-Y (%) - Monthly



Source: MoSPI, CRISIL Research

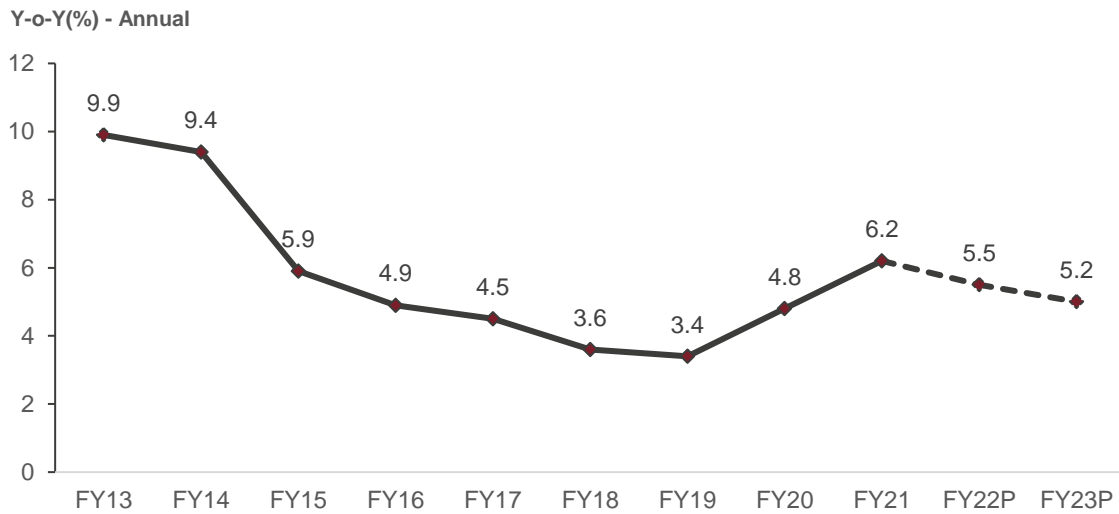
CPI inflation to average around 5.5% in fiscal 2022 and 5.2% in fiscal 2023

In this fiscal so far (April 2021-January 2022), CPI inflation has averaged 5.3%, compared with 6.4% in same period last year. CRISIL Research expects the CPI number to stay around these levels next fiscal, too. While lower excise duties on petrol and diesel relative to last year will help cap the rise in fuel inflation, the outlook on international crude prices has worsened considerably on account of rising geopolitical tensions.

CRISIL Research expects Brent crude prices to average \$80-85 per barrel in calendar 2022, compared with \$70.4 per barrel in 2021. The second upside risk might build on core CPI inflation. Fiscal 2021 has seen input cost pressures rising significantly for producers, while firms were unable to fully pass on cost pressures as demand recovery was weak and uneven, we believe it can increase next fiscal as recovery in domestic demand strengthens and becomes more broad-based.

Due to these factors, we expect CPI inflation to moderate only slightly to 5.2% in fiscal 2023 compared with an expected 5.5% in the current fiscal of 2022.

Outlook for CPI in India

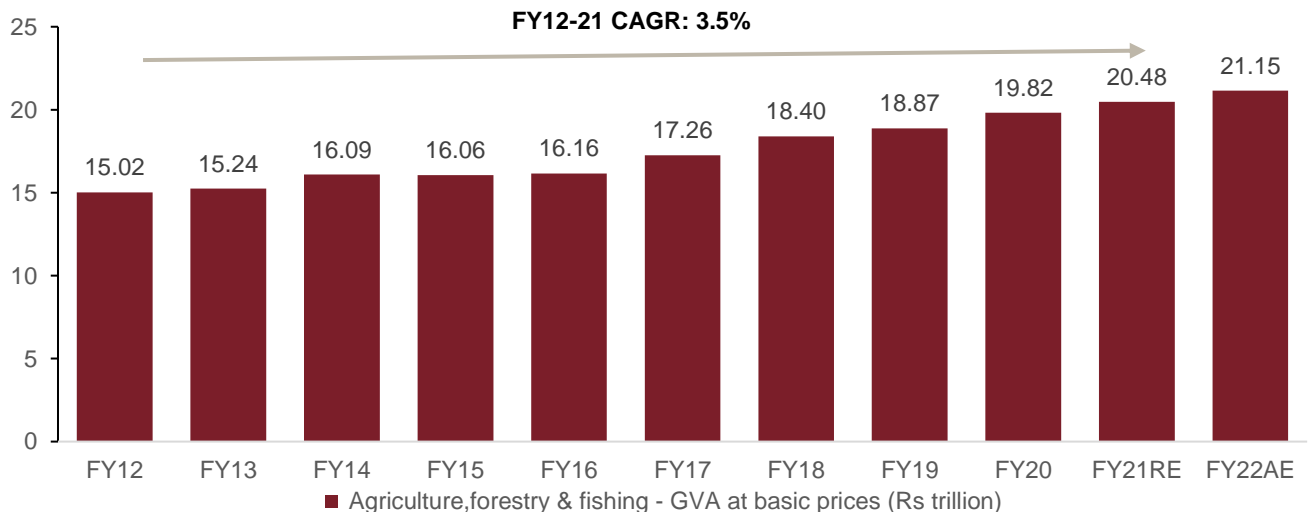


Source: MoSPI, CRISIL Research

Agriculture, Forestry and Fishing (AFF) contributes to 16.4% of the total GVA in fiscal 2021

The agriculture, forestry and fishing segment has been a key contributor to the total gross value added. The GVA of this segment has grown by 3.5% during the period FY12 to FY21. The segment contributed 15.5% of the total GVA during FY21.

Gross value added (GVA) by agriculture, forestry and fishing and share in total GVA (constant FY12 prices)



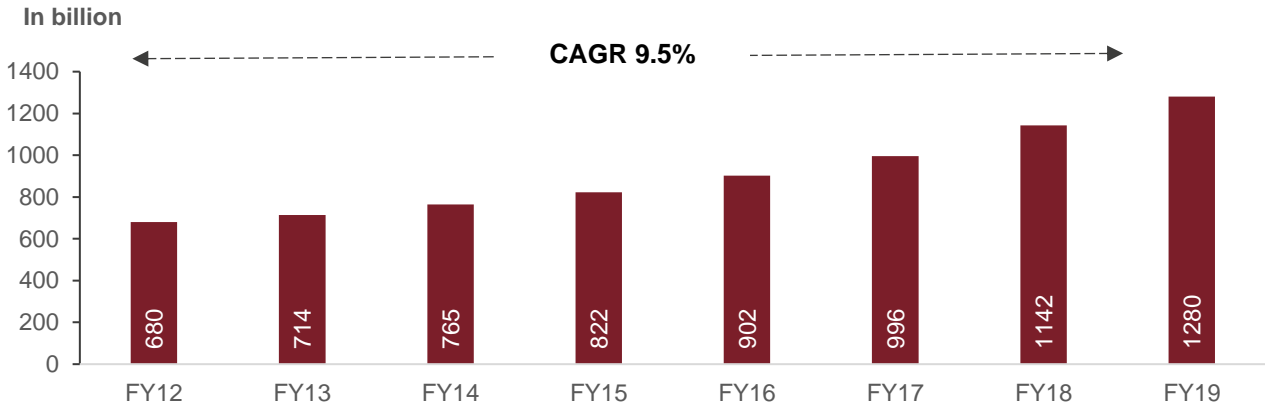
	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE
Share of Agriculture, forestry, and fishing in overall GVA	18.5	17.8	17.8	16.5	15.4	15.2	15.3	14.8	14.8	15.5

Source: Second advance estimates of national income 2021-22 and quarterly estimates of gross domestic product for the third quarter (Q3) of 2021-22 (Feb 2022), MoSPI, CRISIL Research

Share of fisheries sector in AFF have grown from 4.5% to 6.8% between FY17 and FY19

In terms of GVA, the fisheries sector has been fastest growing segment among the agriculture, forestry, and fisheries sectors. The GVA of this segment has grown by ~9.5% during the period FY12 to FY19. This segment has contributed a share of 6.8% in agriculture, forestry, and fisheries GVA, whereas ~1% to overall GVA as of fiscal 2019

Gross value added (GVA) of fishing and it’s share (constant FY12 prices)



	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Share of fisheries in Agriculture, forestry, and fishing	4.5%	4.7%	4.8%	5.1%	5.6%	5.8%	6.2%	6.8%
Share of fisheries in Overall GVA	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	1.0%

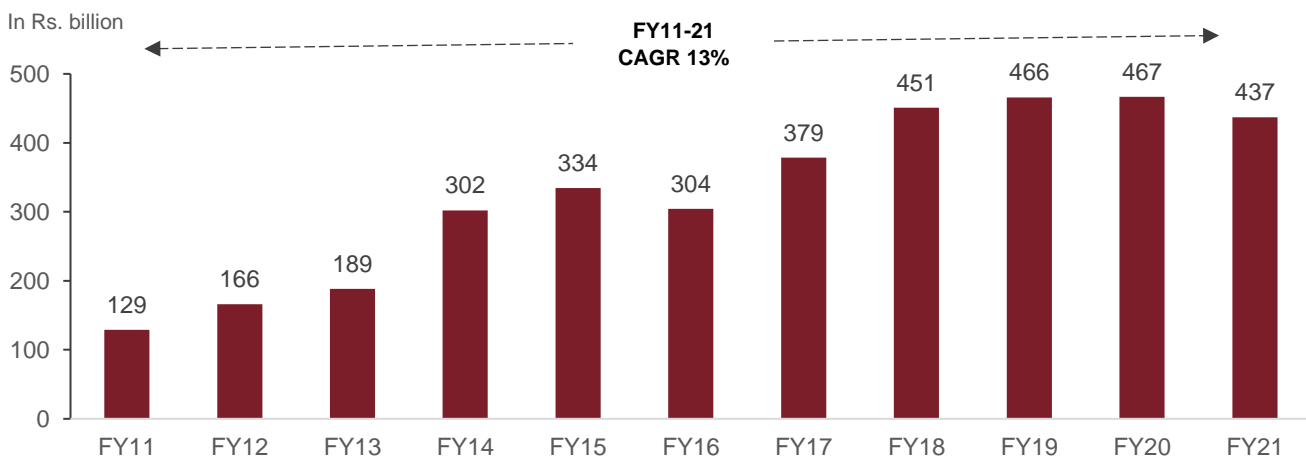
Note: Fiscal 2019 is the latest data available

Source: Central Statistics Office, Ministry of Statistics & Programme Implementation, Government of India, CRISIL Research

India’s export of fish and fish products has grown at 13% CAGR from fiscal 2011 to 2021

India has a coastline of 7,516.6 km (including mainland, Lakshadweep Islands and Andaman & Nicobar) which aids India’s fishing population. Export of fish and fish products from India has seen a growth of 13% CAGR from Rs.129 billion in fiscal 2011 to Rs. 437 billion in fiscal 2021. Of the total exports in fiscal 2021, frozen shrimp has occupied the highest share of 74% followed by frozen fish which occupied a share of 7% during the same period.

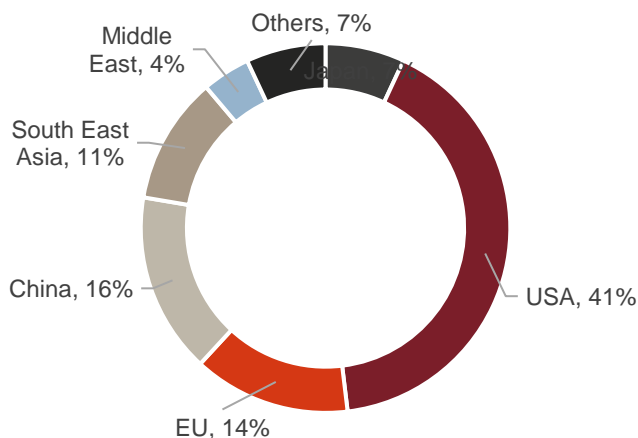
India fish and fish products exports



Source: MFRDA, CRISIL Research

Among the exports of fish and fish products, for fiscal 2021, USA stands as the major export market for India with a share of 41% followed by China (16%) and European union (14%).

Regional-wise share of fish and fish-product exports

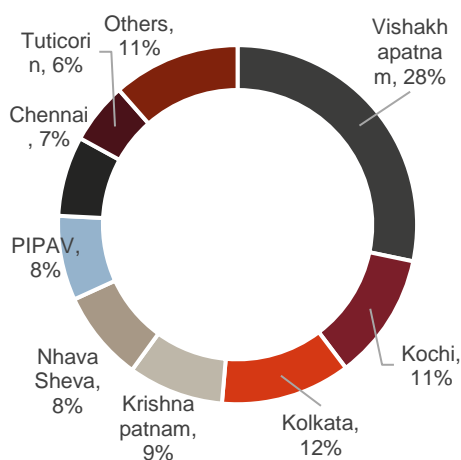


Source: MFRDA

Vishakhapatnam port contribute to highest export of fish and fish products (value terms) from FY18 to FY21

For fiscal 2021, exports of fish and fish products have been highest from Vishakhapatnam port with a value of 124 million occupying a share of 28% in total fish and fish products. It is closely followed by Kochi port with a share of 11% during the aforementioned period.

Port-wise share in exports (FY21)



Source: MFRDA

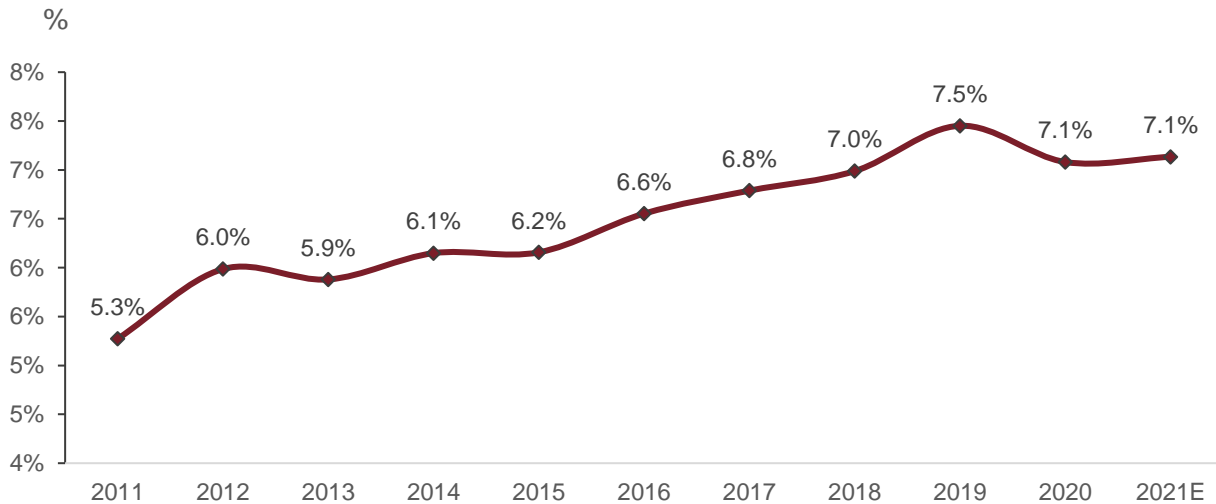
Port-wise export of fish and fish products

Rs. Mn	FY18	FY19	FY20	FY21
Vishakhapatnam	114	119	131	124
Kochi	58	59	49	50
Kolkata	49	52	53	51
Krishna Patnam	48	46	51	38
Nhava Sheva	47	48	44	36
PIPAV	49	48	46	33
Chennai	21	20	20	31
Tuticorin	27	28	29	24
Others	39	45	43	50
Total	451	466	467	437

India occupies a share of 7.1% in the global fish production as of CY 2021

As per OECD-FAO data, among the global fish production, India occupies a share of 7.1% as of CY 2021 estimates. This share of India has grown from 5.3% in CY 2011. During the periods mentioned from CY 2011 to CY 2021, as per OECD-FAO data, production of fish in India has grown at a CAGR of 5% reaching a value of 124.8 million tonnes.

Growing share of India in global fish production



Source: OECD-FAO Agricultural Outlook 2021-30 and CRISIL Research

Government providing support for the growth of fisheries sector in India

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

As a part of Aatmanirbhar Bharat Abhiyan, PMMSY has been approved in fiscal 2021 in order to enhance the blue revolution by focusing on sustainable and responsible development of fisheries sector in India. The major objective and aims of this scheme include

- Harnessing of fisheries potential in a sustainable, responsible, inclusive and equitable manner
- Enhancing of fish production and productivity through expansion, intensification, diversification and productive utilization of land and water
- Modernizing and strengthening of value chain - post-harvest management and quality improvement
- Doubling fishers and fish farmers incomes and generation of employment
- Enhancing contribution to Agriculture GVA and exports
- Social, physical and economic security for fishers and fish farmers
- Robust fisheries management and regulatory framework

Inline with the above-mentioned aims and objectives, the scheme has envisaged following targets to be achieved during the period of the scheme catering to various segments such as productivity, employment generation and value addition in the fisheries sector.

Fish production and productivity	Economic value addition	Enhancing income and employment generation
<ul style="list-style-type: none"> Increasing fish production to 22 million metric tonnes by fiscal 2025 Improving the aquaculture productivity to 5 tons per hectare Increasing fish consumption in the country to 12kg per capita 	<ul style="list-style-type: none"> Increasing contribution of fisheries sector agriculture GVA to 9% by fiscal 2025 Increasing the earnings from exports to Rs. 1 trillion by fiscal 2025 Reduction in post-harvest losses from levels of 20-25% to 10% Encouraging private investments and entrepreneurship in fisheries sector 	<ul style="list-style-type: none"> Doubling the incomes of fishers and fish farmers Generation of 5.5 million employment opportunities directly and indirectly along the value chain

This scheme with an overall investment of Rs. 2,005 billion will be implemented over a period of five years from fiscal 2021 to fiscal 2025 as an umbrella scheme with two components

- Central sector scheme, wherein the project cost is borne by the central government
- Centrally sponsored scheme, wherein the cost will be shared between states and central government and all the sub-components/ activities will be carried forward by state/ Union territories

Fisheries and Aquaculture Infrastructure Development Fund (FIDF)

Fisheries and Aquaculture Infrastructure Development Fund (FIDF) has been envisaged under union budget 2018. With a fund size of Rs. 752.2 billion this scheme tries to improve the fisheries infrastructure facilities both marine and inland fisheries sectors and also achieve the target of 15 million tonnes by 2020 set under the Blue Revolution. In addition, FIDF also tries to achieve sustainable growth of 8-9% in order to achieve fish production of 20 million tonnes by fiscal 2023.

National Fisheries Development Board (NFDB) of Hyderabad acts as the Nodal Implementing Agency for implementation FIDF Scheme. FIDF provides concessional finance to the Eligible Entities (EEs), which include State Governments/Union Territories and State entities for development of identified fisheries infrastructure facilities. This concessional finance is provided through Nodal Loaning Entities (NLEs) such as

- National Bank for Agriculture and Rural Development (NABARD),
- National Cooperatives Development Corporation (NCDC) and
- All scheduled Banks

Activity-wise key proposals received

Sl.No	Name of Activity	Proposals	Project cost (Rs. Mn)
1	Establishment of Fishing Harbours	28	400.1
2	Development of Aquaculture	24	10.2
3	Establishment of Fish Landing Centers	23	34.5
4	Any other innovative projects/activities designed to enhance fish production/productivity/value	22	78.1

Sl.No	Name of Activity	Proposals	Project cost (Rs. Mn)
5	Modernization State Fish Seed Farms	13	63.8
6	Fish Processing Units	6	14.5
7	Establishment of state of art of Fisheries Training Centres	5	31.7
8	Introduction of Deep-Sea Fishing Vessels	5	0.5
9	Development of Hatcheries	5	2.3
10	Construction of Cold storage (both Marine and Inland Fisheries Sectors)	5	0.9

Note: data is as of January 7th, 2022

Source: National Fisheries Development Board, CRISIL Research

Blue revolution

Blue revolution which focuses mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine was launched in December 2015 as centrally sponsored scheme. The scheme was launched for a period of 5 years from fiscal 2016 to fiscal 2020 with an outlay of Rs. 300 billion with following objectives

- To increase the overall fish production in a responsible and sustainable manner for economic prosperity
- To modernize the fisheries with special focus on new technologies
- To ensure food and nutritional security
- To generate employment and export earnings
- To ensure inclusive development and empower fishers and aquaculture farmers

Major targets achieved by the scheme include

Fish production

- Increase in fish production from 10.26 million MT in fiscal 2015 to 13.75 million MT in fiscal 2019

Productivity

- Enhancement in productivity from 2.3 tons per hectare to 3.3 tons per hectare

Exports

- Exports saw an increase from Rs. 3,344.2 million to Rs. 4,658.9 million in fiscal 2019

Source: Department of Fisheries, CRISIL Research

Kisan Credit Card (KCC)

During the budget announcement for fiscal 2019, Government of India has extended Kisan Credit Card (KCC) facility to fish and animal husbandry farmers in India. This scheme was introduced in order to meet the working capital requirement by fish farmers. The major aim of this scheme is to provide adequate and timely credit to farmers.

KCC facilities can be availed by Fishers, Fish farmers, Self help groups, woman groups and joint liability groups. Currently, a credit limit of Rs. 0.3 million is provided to already existing KCC farmers while a credit limit of Rs. 0.2 million is provided for new KCC farmers for activities related to fisheries and animal husbandry.

For fisheries the working capital costs that are included under KCC include recurring costs such as

- Seed
- Feed
- Organic and inorganic fertilisers
- Lime/ other soil conditioners
- Harvesting and marketing charges
- Fuel/electricity charges
- Labour and
- Lease rent (if leased water area)

For capture fisheries these working capital costs may include

- Fuel charges
- Ice
- Labouring charges
- Mooring/ landing charges etc.

As of fiscal 2021, 59,538 KCCs have been issued and additional 0.4 million applications are at various stages of issuance with banks.

Fisheries sector attracts a on-year growth of 51% in fiscal 2023 budget allocation

During the budgetary allocation for fiscal year 2023, department of fisheries has attracted a uptick of 73% with budgetary allocation rising from Rs. 14.07 billion (revised estimates) in fiscal 2022 to Rs. 21.18 billion in fiscal 2023. In addition, allocation for Pradhan Mantri Matsya Sampada Yojana (PMMSY) has been enhanced by 56% to Rs. 18.79 billion for the fiscal year 2022-23 from Rs. 12.1 billion (revised estimates) during 2021-22.

Parameter	Actuals FY21	RE FY22	BE FY22
	In billion	In billion	In billion
FIDF	0.09	0.1	0.12
PMMSY	7.09	12.10	18.91
Overall department of fisheries	8.82	14.07	21.18

BE: budget estimates, RE: Revised estimates

Source: Budget document

Key budget proposals for FY2022-23 for fisheries sector

In union budget for fiscal 2022-23, government has reduced customs duty on various products such as live vannamei shrimps (30% to 10%), black tiger shrimps (30% to 10%), frozen krill (30% to 15%), frozen mussels (30% to 15%), and frozen squids (30% to 15%). This reduction in customs duty will lower the cost of imports and thus boosting the growth in fisheries sector in turn aiding to achieve the export target of Rs.1 trillion by fiscal 2025.

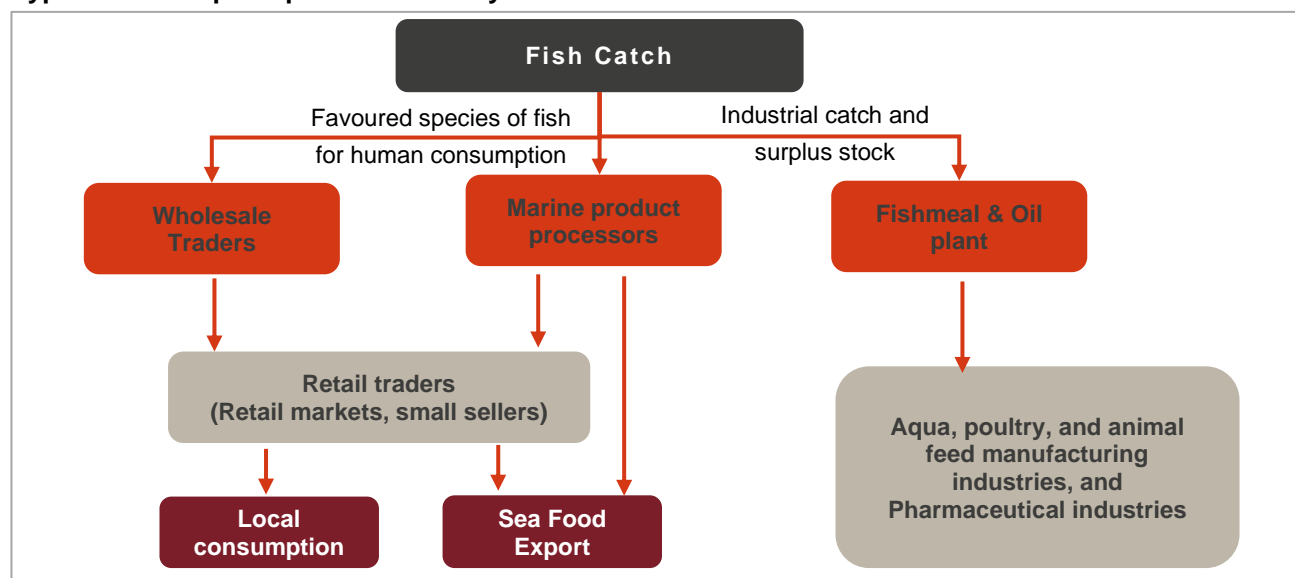
2 Overview of fishmeal and fish oil industry in India

2.1 Introduction

Fishmeal and fish oil, which have a huge demand in aquaculture and animal feed industries, are the most important co-products made from stocks of fish.

Established at the beginning of the 19th century, the industry mainly met the oil requirements of sectors such as leather tanning, production of soap and glycerol, paints and other non-food products. The dry residue left after extracting the oil – fishmeal – was used as fertiliser. By the 21st century, fishmeal started finding usage as animal feed due to its high protein content and fish oil in the medical field due to its high content of omega-3 fatty acids. Thus, as time progressed, the traditional uses of fish oil in various industries diminished. Now fishmeal is chiefly used in the diets of fish, pigs and poultry which need higher quality protein than other farm stock, such as cattle and sheep. Fish oil now finds application in pharmaceutical industries and in some dietary supplements.

Typical consumption pattern of fishery catch



Source: Industry, CRISIL Research

Note: Animal feed includes feed to animal husbandry industries and pet food industries

Fishmeal and fish oil are produced from i) fish considered as industrial catch (those caught specifically for making fishmeal and fish oil), ii) surplus stock from by-catch of fisheries for human consumption. Sometimes offal and trimmings from sea-food processing industries are used along with whole fish, mostly by smaller players, to produce fishmeal. Industrial catch are high protein edible species of fish such as sardines which are the major source of protein in aqua feed protein chain. While industrial catch comprises edible species of fish, they are not majorly favoured for direct human consumption. On account of economical price of the raw material (fish), wild species from sea are generally used in the fishmeal and fish oil industry rather than aquaculture species. According to the International Fishmeal and Fish Oil Organisation (IFFO), now known as IFFO - The Marine Ingredients Organisation, around 30-35% of the wild catch goes into the production of fishmeal and fish oil.

2.2 Value chain of the industry

The fishmeal and fish oil industry relies on fishing in oceanic waters for procurement of raw materials. Typically, the larger raw material vendors (fishermen) use mechanised and motorised boats while the smaller fishermen use non-motorised boats, along with gears such as seines, trawls, gillnets and bagnet for fishing. According to Central Marine Fisheries Research Institute (CMFRI) data, mechanised and motorised boats account for nearly 97% of the total marine landings while the rest 3% is accounted by non-motorised boats as of fiscal 2018.

In India, the peak season for fishing is August-December and the slack season is January-May. Fishing is not allowed in Indian waters during June-July as it is the monsoon season. Fishmeal and fish oil production follows the same season as fishing. The output is stocked to cater to the demand of domestic and exports market.

Availability of raw material key monitorable

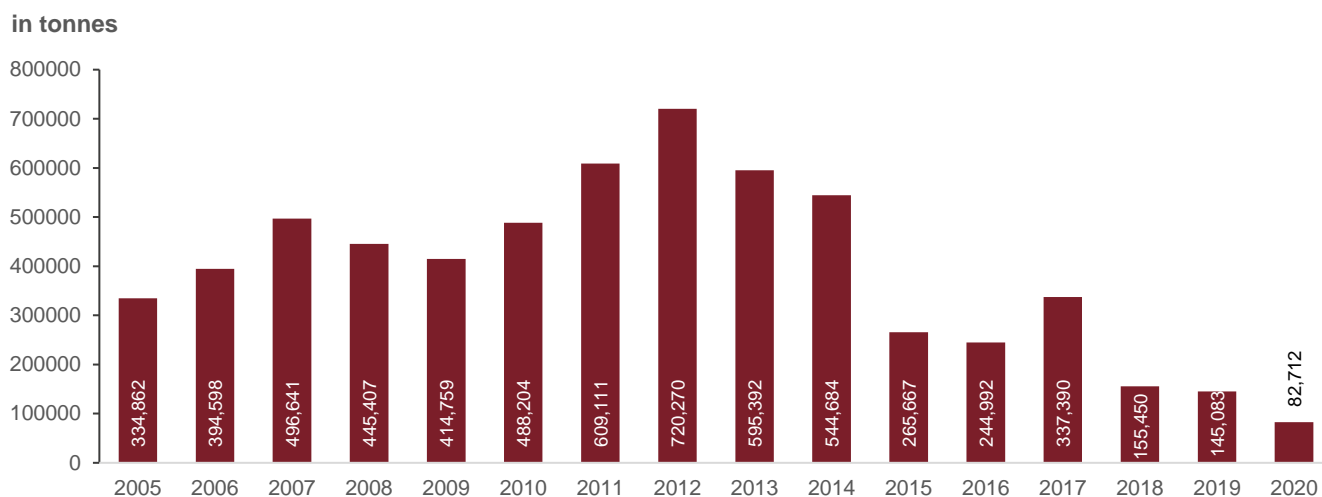
In the entire process of production of fishmeal and fish oil, availability of raw material is a key monitorable. The industry procures raw material from fishing in the oceanic water and thus is dependent on fish landings in the Indian coastal waters. Large players have diversified their procurement across the Indian coastline so as to minimize their dependence on one particular coastal landing and fish catchments.

The fish landings is an important factor which determines the total quantity available for fishing and further use. Any drop in the fish landings hugely affects the entire sea-food and fish processing industry, which is dependent on the wild catch. Also the quality of fish in terms of nutrient content and growth of adult population determine the yield and output quality of fishmeal and fish oil. Thus, even the prices of end product are dependent on the quality of fish caught. The dependency of multiple stakeholders (fishers, fish processors, consumers, industrialists and exporters) on fish landings makes it necessary to initiate appropriate management measures for judicious harvesting of the resource.

According to Indian council of agricultural research (ICAR) - CMFRI report on Indian oil sardine (IOS), availability of fish in the ocean water is affected by factors that are classified as i) environmental, such as El Niño and erratic rainfall; ii) biological, such as spawning failure, competition from other species of fish, and lack of food; and iii) anthropogenic, such as overfishing. Being a living natural resource, fish have limitations in replenishing and are severely affected by climatic and environmental changes. Any change in climatic conditions affects the growth and breeding of fish and thus impacts the adult population during a particular season in the coastal waters. Overfishing and fishing of juvenile species also affect the fish population over the long run.

IOS is a key raw material used by Indian fishmeal and fish oil industry. The landings of IOS have declines drastically from 0.5 Mn tonnes in 2014 to below 0.15 Mn tonnes in 2019 and further down to 0.08 Mn tonnes in 2020. According to CMFRI, IOS is known for its capricious nature with its seasonal, annual, inter-annual and decadal peaks and slumps in availability. The resilience of a fish population to exploitation is largely dependent on the reproductive traits. IOS species with its volatility is also known to replenish fast, after decline in availability, on account of its natural characteristics of rapid growth, early maturity, high fertility, and protracted spawning period. According to ICAR-CMFRI report, IOS species have medium to high resilience capacity and due to which the IOS fishery along the southwest coast of India is expected to revive in a span of 2 - 3 years post any decline, as supported by historical fishery trends. Decline in fishing landing due to over and unsustainable fishing and changing climatic conditions is a key risk factor for the fishmeal and fish oil industry.

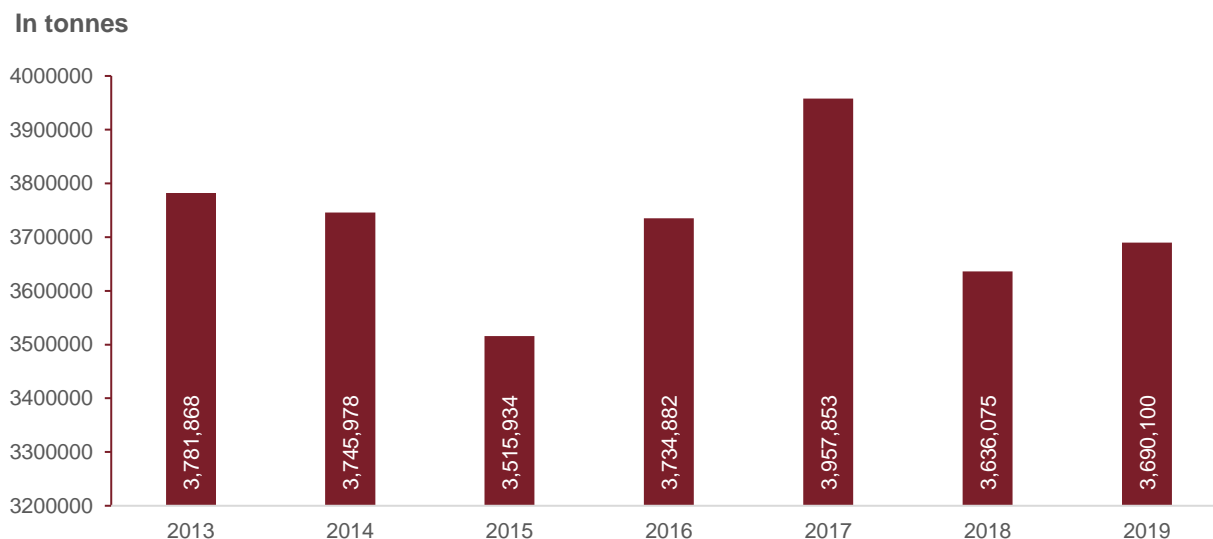
Trend in Indian Oil Sardine landings in Indian Ocean (2005-20)



Note: Latest data available is as of 2020

Source: Central Marine Fisheries Research Institute (CMFRI), CRISIL Research

Trend in Marine landings



Note: Latest data available is as of 2019

Source: Central Marine Fisheries Research Institute (CMFRI), CRISIL Research

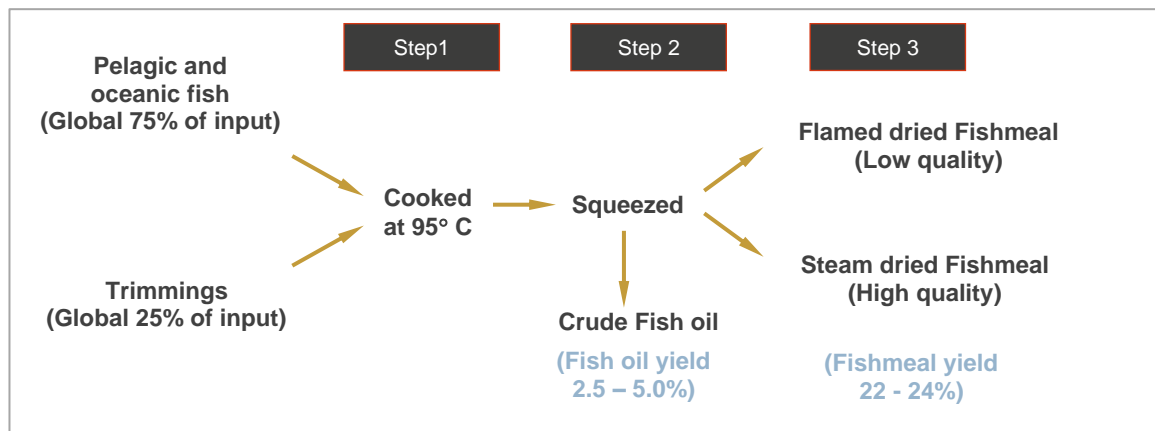
Fishmeal, fish oil are by-products obtained from cooked fish

Fishmeal and fish oil are produced by processing cooked fish. Fishmeal is the solid matter of fish and fish oil the liquid-oil matter. A liquid water-based by-product called fish-soluble, which is high in water content and contains soluble proteins, is obtained during the production of fishmeal and fish oil. Various species can be used for fishmeal and fish oil production, but oily fish are the main groups of species utilised.

Fishmeal is a concentrated source of protein. It is in powdered form and appears brownish in colour. Fish species with high protein content such as sardines, are cooked and pressed to remove liquid matter. The solid matter is further dried and ground to form crude flour or powdered fishmeal.

Fish oil is a clear brownish yellow liquid obtained by pressing the cooked fish. It is generally made from oily species, such as sardine, mackerel and tuna. The oil is derived from fish tissues. Oil sardine is the preferred source of fish oil due to its high contents of nutrients and omega-3 fatty acids.

Production of fishmeal and fish oil



Source: www.thefishsite.com, CRISIL Research

Manufacturing process of fishmeal and fish oil

There are several ways of making fishmeal from raw fish. The easiest is to let the fish dry in the sun and then grind it. This is the traditional method used in some parts of the world where processing plants are not available. The quality of the product, however, is poor compared with the ones made using modern methods such as steam sterilised plants. Almost all fishmeal is made by cooking, pressing, drying and grinding the fish in the machinery designed for the purpose. Although the process is simple in principle, it requires considerable skill and experience, quality control, sustainable technology and R&D to produce high yield, and high quality product and to ensure that plants operates with high efficiency.

Cooking: While cooking, the protein in the fish is coagulated and much of the water and oil runs off, or can be removed by pressing. Raw fish does not lose much of the oil and water even under very high pressure and so cooking is required. A commercial cooker is used to cook and the fish is moved with the help of a conveyor system. Cooking is a critical operation, performed under controlled temperature and time. If fish is incompletely cooked, the liquid matter cannot be pressed out satisfactorily, and if it gets overcooked, the material becomes too soft for pressing. Drying is not done while cooking.

Pressing: Pressing removes some of the oil and water (liquid matter) from the cooked fish. The fish are conveyed through a perforated tube and subjected to increasing pressure. A mixture of water and oil is squeezed out through the perforations. The solid matter, known as press cake, is derived at the end of the process. During the pressing process, the water content may be reduced to about 50% from about 70% and the oil content to about 4% in the press cake.

Separation of oil: After straining coarse pieces of solid material, the liquid matter from the presses is continuously centrifuged to remove and separate the oil. The oil is sometimes further refined and filtered, before being pumped into storage tanks. The refined oil is valuable and is used in the manufacture of edible oils and fats.

In some other methods, the pressing machines are completely replaced by centrifuges. Centrifugal oil separation is modern technique used for oil separation. Solvent extraction is yet another method used to remove oil.

The water portion of the liquid matter contains dissolved material and fine solids in suspension. The solids are mostly proteins and the liquid can contain as much as 20% of them. It is normally well worth recovering the solids from the liquid matter. The material is recovered by evaporating the water and marketed separately as condensed

fish soluble. This can be added back to the press cake and dried to make what is known as whole meal. This helps achieve high yield for production of fishmeal.

Drying: It is important to get the drying conditions right. If the meal is under-dried, there is a possibility that moulds or bacteria will grow. Conversely, if it is over dried, the nutritional value of the meal will reduce due to excess heat.

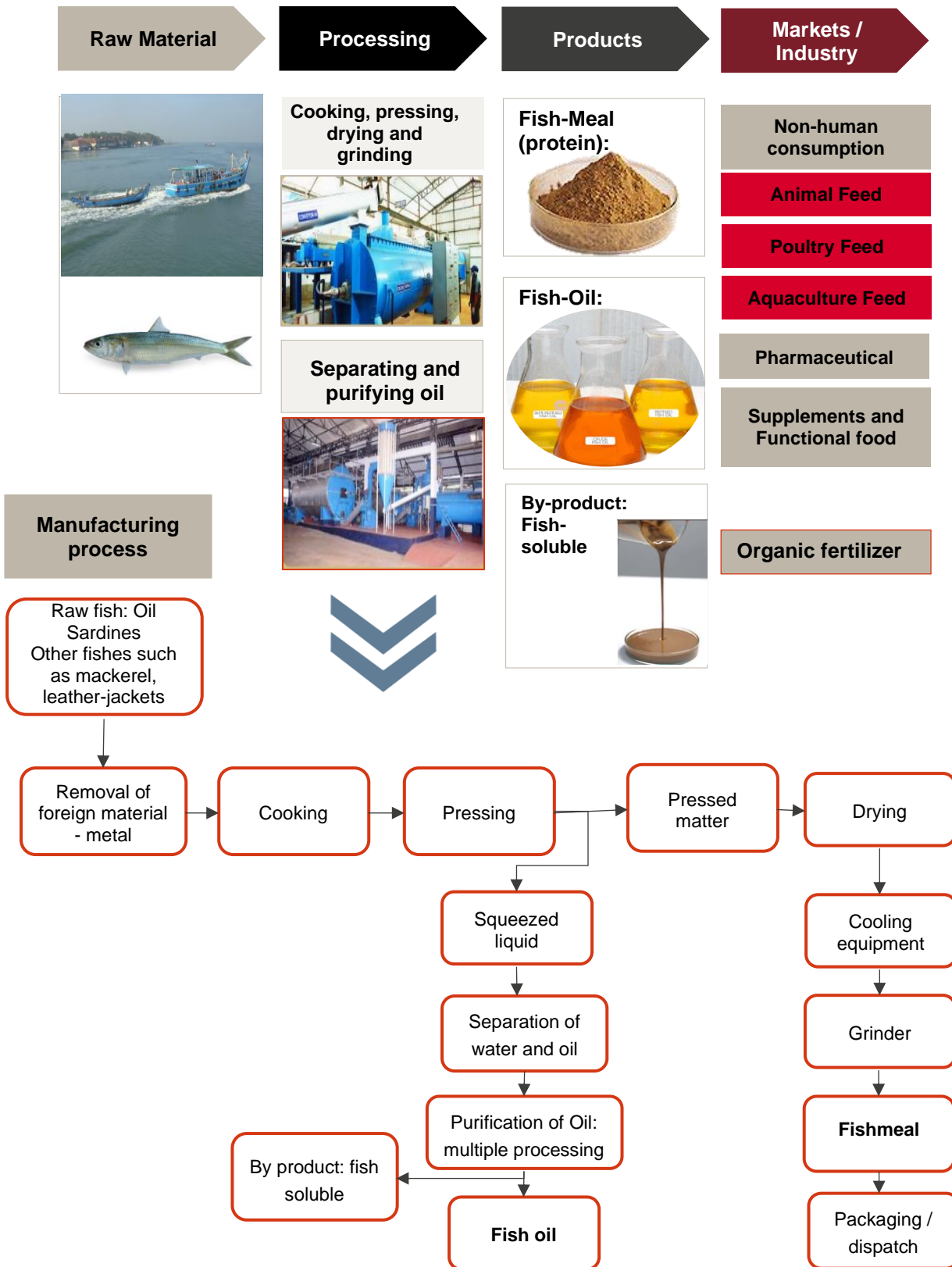
There are two types of drying process – direct and indirect. In the direct drying, hot air at a temperature of up to 500°C is passed over the material which is rotating rapidly in a cylindrical drum. This is quicker but heat damage is much more likely in this process if temperature and time are not carefully controlled. The fishmeal does not reach the temperature of the hot air as the rapid evaporation of water from the surface of each particle of fishmeal causes cooling. Normally, the product temperature remains at about 100°C.

The indirect drying process consists either of a steam jacketed cylinder or a cylinder containing steam heated discs which also rotates the fishmeal. Much of the unpleasant odour from fishmeal plants originates from the dryers; indirect drying process causes less trouble as it uses lesser air compared with direct drying process.

When the raw material, fish, contains less oil or is not oily species, the pressing will not yield high amount of useful liquid matter.

Grinding and bagging: The final step is to grind the solid matter and break down any lumps and particles of bone. The ground and dried fishmeal is then packed in bags or stored in silos for bulk delivery. Since water content in fishmeal is low, the shelf life of the products is good. High inventory of the product can be stocked by players.

Fishmeal & Fish Oil Value Chain



Fishmeal is rich source of protein and essential amino acids

Fishmeal is predominantly used as a rich source of protein in compound feeds. Compound feed is animal feed made from a combination and mixture of various raw materials and additives. Non-compound feed has a single source ingredient.

Fishmeal carries large quantities of energy per unit weight and is an excellent source of proteins, lipids, minerals and vitamins and contains very less carbohydrates. It is easily digestible and considered as high-quality ingredient in aquaculture, poultry and animal feed industry. Fishmeal and fish oil is usually deemed unsuitable for direct human consumption, but fish protein concentrate (FPC), which is same as fishmeal but produced with high-quality inspection, is considered fit for human consumption.

The protein content of fishmeal varies from 50% to 65%, even reaching 70% when prepared from protein rich species. The table below depicts a comparison of protein content of various raw materials used to make animal feeds. Fishmeal also provides balanced composition of essential amino acid, phospholipids and fatty acids, which help optimum development, growth, and reproduction in animals. Fishmeal is largely used in aquaculture feeds, followed by pig and poultry sector. Compared with other protein feeds, fishmeal has the higher content of easily digestible proteins, minerals, vitamins, and essential amino acids. This makes it an essential ingredient in aqua, poultry and animal feed.

Protein content of fishmeal v/s other animal feed compounds

Feed raw material	Protein Content (% of dry weight of produce)
Roughage	10-15%
Grains & seeds	8-12%
Grain distilling by-products	15-20%
Other Oilseed meal	25-35%
Groundnut meal	40-50%
Soybean meal	45-55%
Corn Glut meal	55-60%
Fishmeal	65-70%
Fishmeal and offal	50-65%
Fish soluble	35-45%

Source: CRISIL Research

Based on protein content, fishmeal is classified into various grades. Final fishmeal product is rich in protein with 65-70% protein and contains 8-10% of fat, 8-10% of moisture and traces of ash, salt and sand. The acid value of fishmeal and total volatile base nitrogen (TVBN / TVN) are other parameters monitored for grade quality. The lower the TVBN the better, as it is used as fish spoilage indicator.

Grades of fishmeal and protein content

Grade	Protein content
Grade I	60-61%
Grade II	62-63%
Grade III	64-66%
Super prime grade	>67%

Source: CRISIL Research

Fishmeal's nutrient content and, resultantly, its grade depends on the species used and their nutrient content. Grade is dependent on the raw material; better the species of fish, higher the quality of meal. The same holds true for fish oil.

Oily fish and fish oil are the richest source of two groups of omega-3 acids

Fish oil is the fat or oil that is extracted from fish tissue. It is rich in two specific groups of omega-3 fatty acids: docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Omega-3 fatty acids are known to have various health benefits: they support healthy cardio-vascular function and development of the nervous system/ the brain, and boost the immune system.

The World Health Organization (WHO) recommends eating 1-2 portions of fish per week to meet the dietary requirement of fish oil. In the absence of fish intake, a fish oil supplement is recommended. Fish oil contains 30% omega-3 fatty acids as well as vitamins A and D.

Plant sources of omega-3 acids, such as flaxseed and chia seeds, contain another group known as alpha-linolenic acid (ALA).

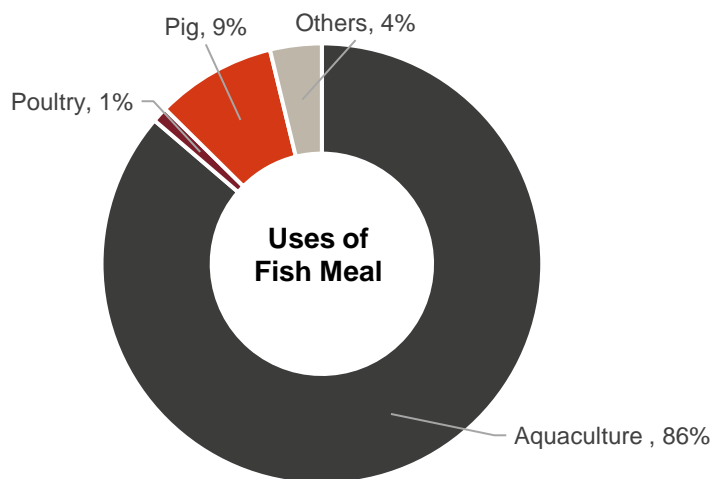
Aquaculture feed represents the dominant usage of fishmeal and fish oil at 86% and 70% respectively for CY 2020

As per IFFO 2021 report, aquaculture feed represents the dominant usage of fishmeal globally at 86% for CY 2020. Fishmeal is transported from the factory to the compound animal feed manufacturers, where it is mixed with other ingredients to make an ideal aquaculture or animal feed. Some of the key players operating in the Indian aquaculture feed manufacturing industry include Avanti Feeds, Godrej Agrovet, Anmol Feeds, CP Foods, Devi Sea Foods, and Grobest Foods.

Fishmeal is also used to fortify feed for animals and poultry. According to industry interactions, incorporating less than 5-10% in the feed for farm animals achieves positive effects. Fishmeal has served as a protein source for livestock for decades because in addition to the beneficial protein and amino acid composition, it has high digestibility of over 90%.

Fishmeal and fish oil contribute indirectly to human consumption as they are used as feed in aquaculture and livestock raising. Application in aquaculture, which has been recording high growth rates worldwide due to the limited catch of wild fish, is especially important for fishmeal and fish oil as it forms an important diet constituent.

Uses of fishmeal (in CY 2020)



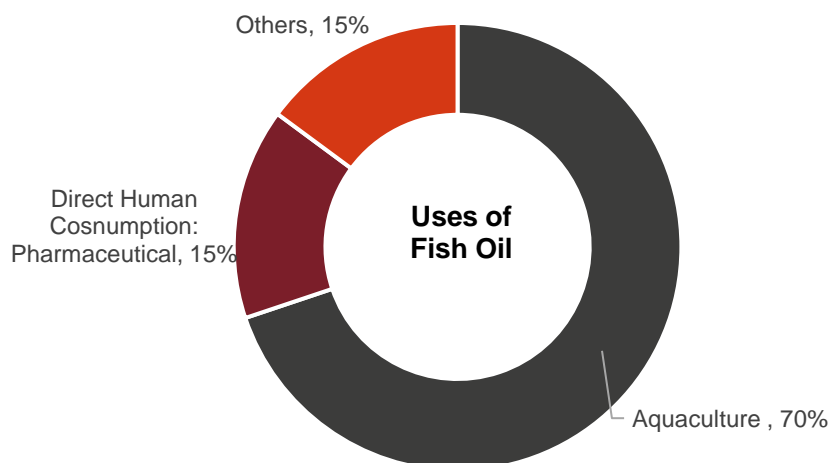
Note: Others include other animal husbandry industries such as cattle, pet feed and agriculture fertiliser.

Source: IFFO, CRISIL Research

Fish oil is largely used for aquaculture feed to maintain omega-3 diet nutrient

As per IFFO 2021 report, aquaculture feed sector dominates fish oil consumption with ~70% share worldwide as of CY 2020. Aquaculture feed requires fish oil as specific species such as oily or carnivorous fish (salmonids and shrimps), chiefly consumed by humans, need to be fed with feed containing fish oil in order to ensure natural diet and to achieve the natural nutrient make-up of fish.

Uses of fish oil (in CY 2020)



Note: Others include cosmetics, animal feed industry, and industrial applications such as paints, leather processing, inks, lubricants etc.

Source: IFFO, CRISIL Research

Use of fish oil directly in human foods and capsules is on the rise. The use in nutraceuticals – nutrients plus pharmaceuticals - had been increasing even more rapidly than that in aquaculture. Fish oil is also used in traces in some cosmetic products.

Other uses include as a carrier for pesticides, in paints and in the leather industry. Fish oil is refined to reduce free fatty acid content and bleached to reduce the colour to be used for different industrial applications, including resins for paints and polymer, ceramic deflocculates and release agents, rust inhibitors and water repellent. Fish oil oxidises rather quickly and turns rancid and, hence, is avoided in packaged food.

2.3 Indian fishmeal and fish oil industry size

In India, the states of Karnataka, Kerala, Maharashtra, Gujarat and Tamil Nadu are home to key fishmeal plants. Karnataka has the maximum number of fishmeal plants - mostly in and around Mangalore.

Indian fishmeal and fish oil industry declined at (2)-(4)% CAGR between fiscals 2017 and 2021

CRISIL Research estimates, the Indian fishmeal and fish oil industry de-grew at a CAGR of (2)-(4)% from Rs 18.0 – 19.0 billion in fiscal 2017 to Rs 16.0 – 18.0 billion in fiscal 2021, largely driven by decline in production of fishoil.

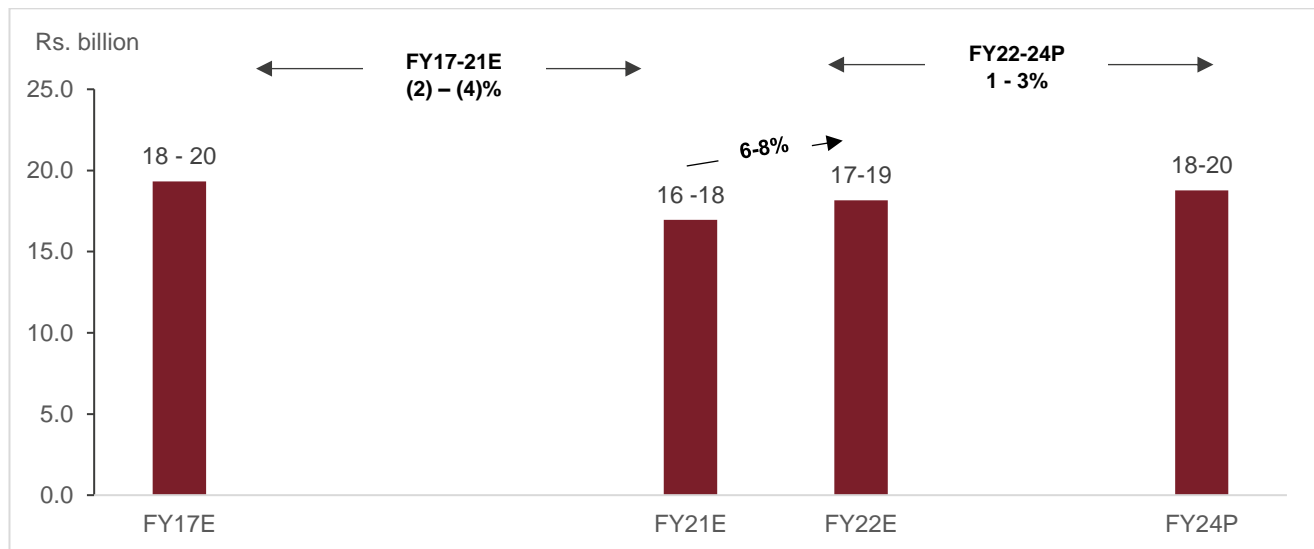
In volume terms as well, CRISIL Research estimates the industry to have de-grown at a CAGR of (2)-(4)% from 140,000-160,000 tonnes in fiscal 2017 to 130,000-150,000 tonnes in fiscal 2021. This decline can be attributed to decrease in fish landing (specifically of oil fish) over the years. In addition, as per our industry interactions, implementation of GST on fish oil (at 12%) and fish meal (at 5%), since 2019, has led to increase in prices, causing end consumers to favour cheap imports as compared to domestic produce.

Going forward, CRISIL Research expects the fishmeal and fish oil industry to grow to Rs 18 - 20 billion by fiscal 2024 growing at a CAGR of 1-3% from fiscal 2022. This future growth is dependent on the improvement of fish landings from the current scenario. Alternatively, if the fish landings to increase as anticipate CRISIL Research expects to remain stagnant during the aforementioned period.

According to IFFO, aquaculture growth is not limited by availability of fishmeal, however it remains an essential feed constituent which is not easy to substitute. Growth of the aquaculture industry will provide the opportunity for fishmeal and fish oil players.

Although there exists an adequate demand for fish meal and fish oil in India driven by the aquaculture industry, the production of fish meal and oil depends on the natural availability of fishes and prevailing climatic conditions during the period inturn creating a supply constraint. In addition to that, the fish availability also depends on the reduction in unsustainable fishing practices wherein juvenile fishes are being caught and processed resulting in overexploitation of resources leading to reduction in fish stock.

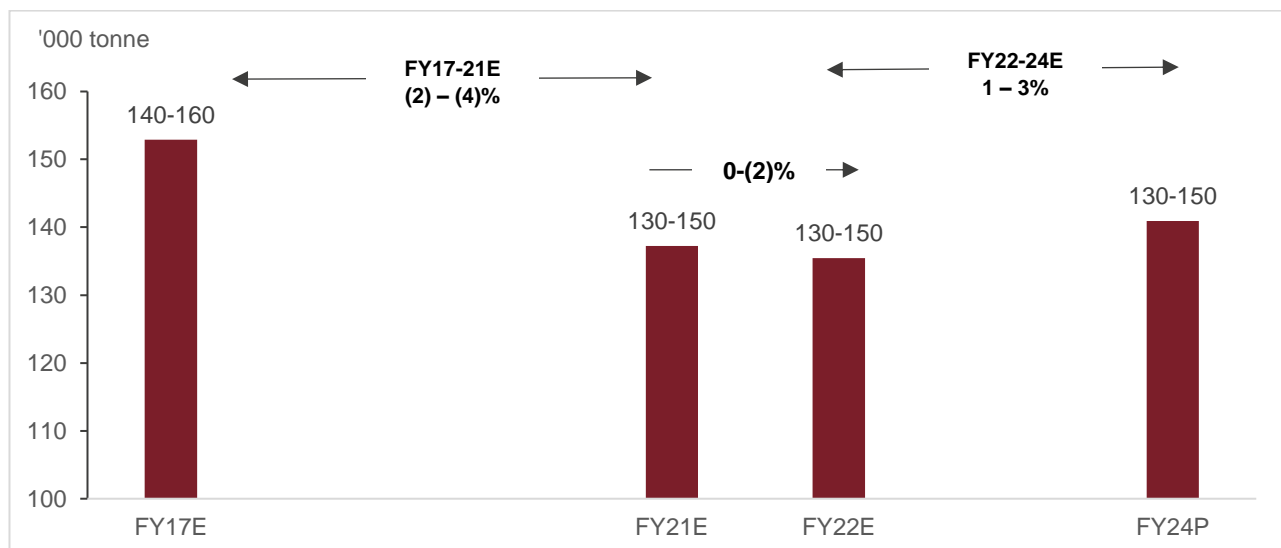
Industry size of Indian fishmeal and fish oil (value terms)



Note: E: Estimates, P - projected

Source: CRISIL Research

Industry size of Indian fishmeal and fish oil (volume terms)



Note: E: Estimates, P - projected

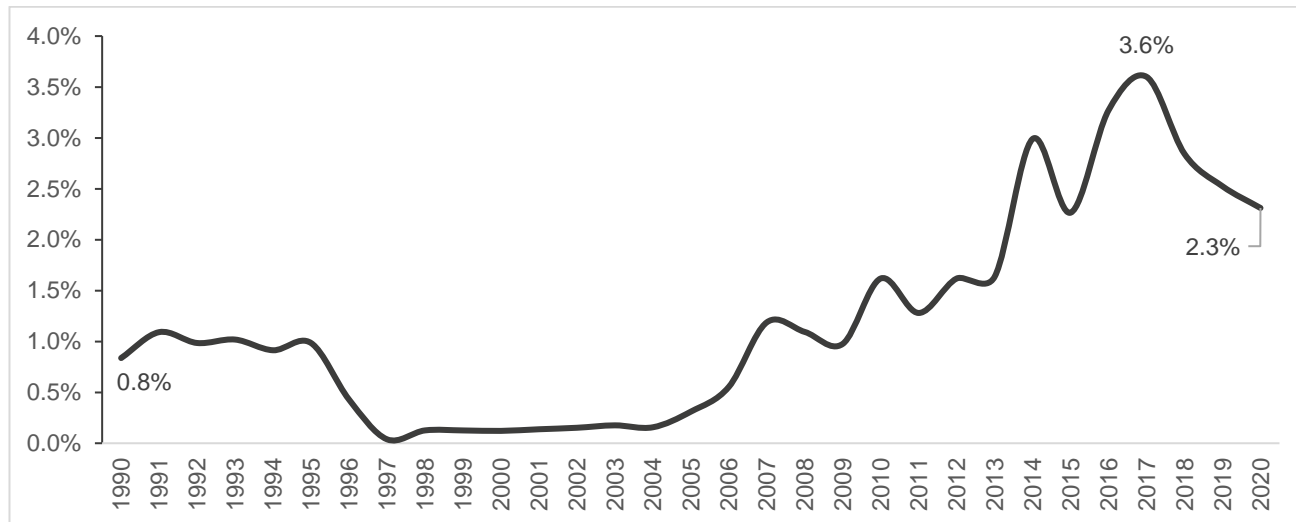
Source: CRISIL Research

Share of Indian fishmeal and fish oil in global production stands at 2.3% in CY 2020

The Indian fishmeal and fish oil industry began to flourish and develop only in the past 15-20 years on account of export demand following a reduction in global production of fishmeal and fish oil.

India accounts for a very low share in global fishmeal and fish oil production but has seen rapid rise over the past two decades; from 0.8% in CY 1990, the share increased to 1.5% in CY 2013 and 2.3% in CY 2020.

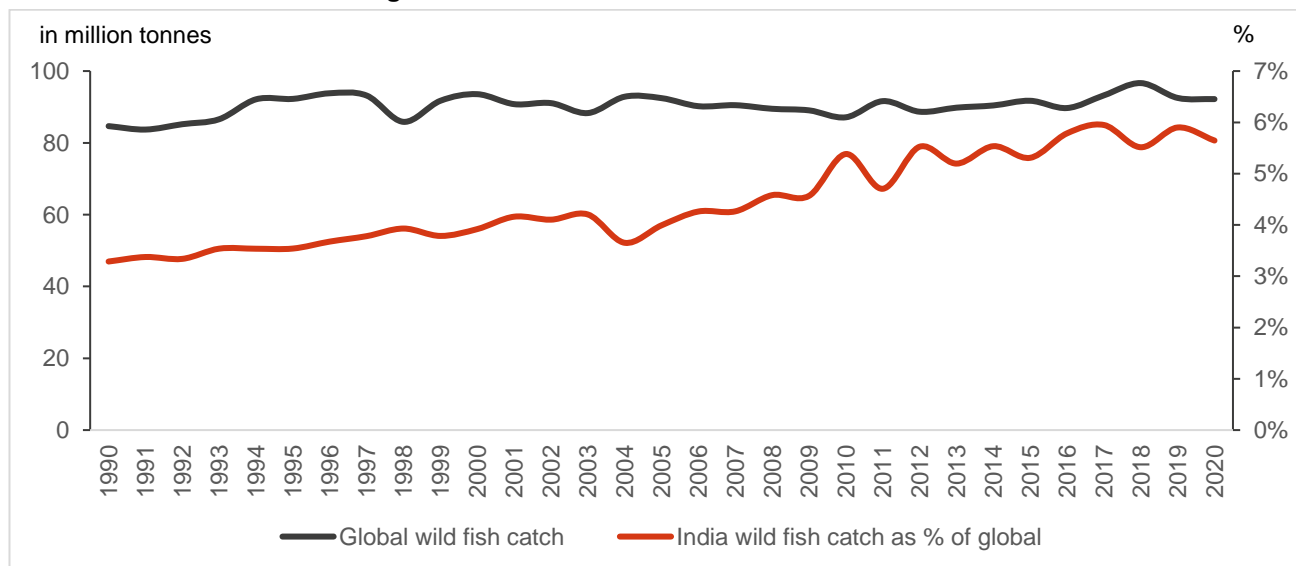
India's fishmeal and fish oil production as a percentage of global production



Source: OECD-FAO Agricultural outlook 2021-30 and CRISIL Research

India's share in global capture of fish has increased steadily over the years due to various factors such as development of relevant industries, increase in the use of modern techniques for fishing, etc. According to OECD-FAO 2020 data, India ranks fourth, after China, Indonesia, and Peru, in terms of country-wise wild fish capture as of 2020. According to OECD-FAO data, India's share in global capture of fishes is expected to remain range bound due to environmental limitations in the supply of fish. Global capture of fish has been stagnant since the 1990s and the trend is likely to continue or decline slightly due to the emphasis on sustainable fishing and limitation in replenishment of fish population.

India's wild fish catch versus global wild fish catch



Source: OECD-FAO Agricultural outlook 2021-30 and CRISIL Research

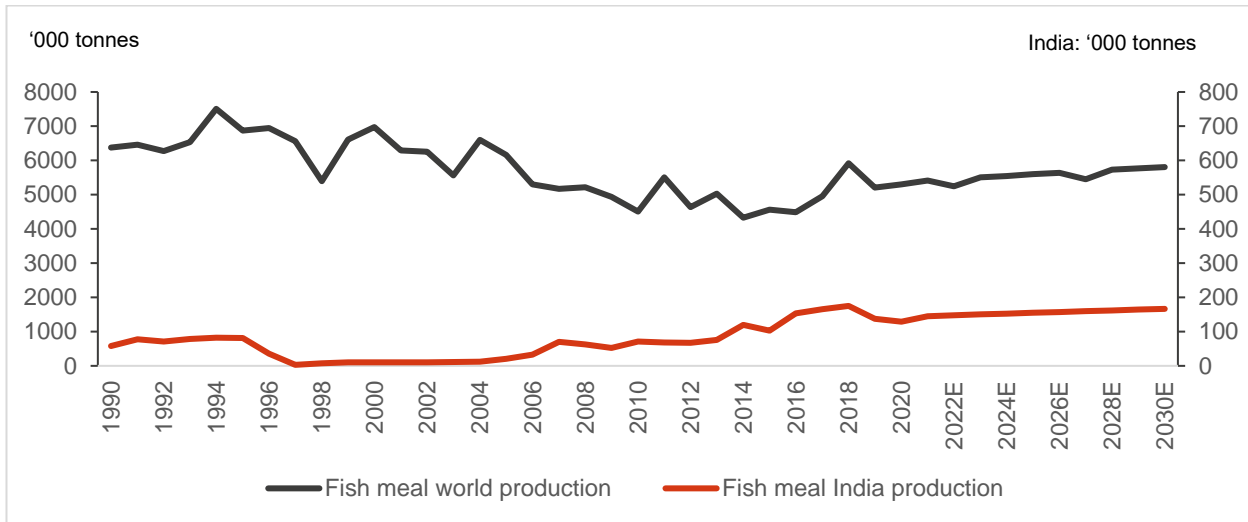
India's production rose 5% in the past decade, faster than global production

Indian fishmeal and fish oil production has trended upwards over the past decade or so. As per OECD-FAO data, global production of fishmeal and fish oil grew at a CAGR of 2% between CY 2010 and CY 2020, whereas India's production grew at a CAGR of 5% during the same period. OECD-FAO expects global fishmeal and fish oil production to grow at a moderate pace in the mid-term and long-term on account of limitations in the availability of fish.

Global production of fishmeal and fish oil has been volatile

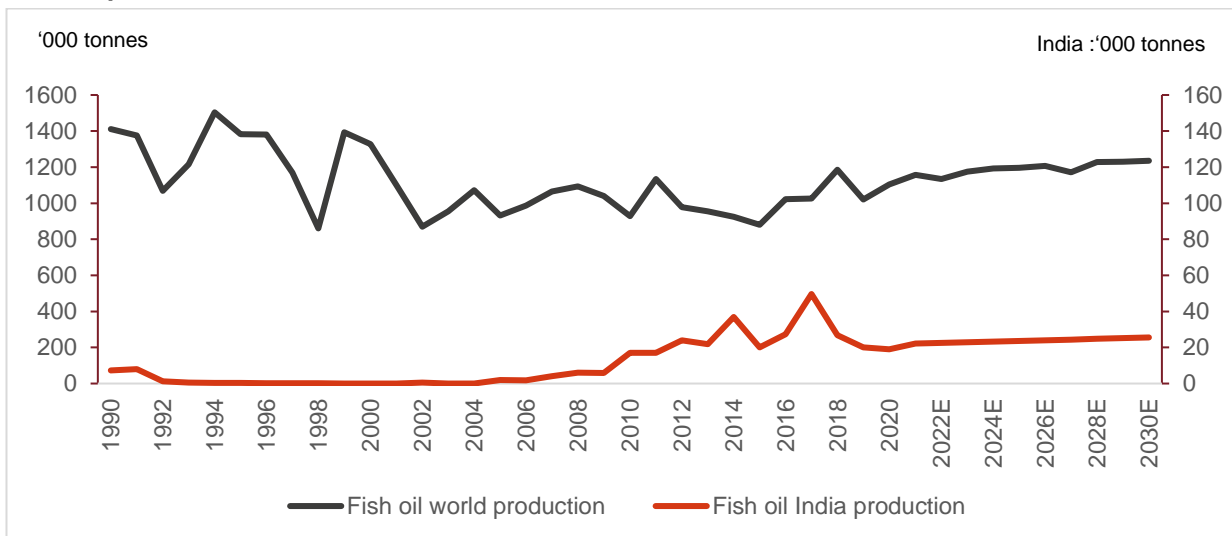
Fishmeal and fish oil production is volatile in nature due to variability in raw material availability. According to OECD-FAO Agricultural Outlook 2021-30, global fishmeal and fish oil production has been volatile during the past two decades as seen in the production charts below from CY 1990 to CY 2020. Global fishmeal and fish oil production has been declining slowly due to limited supply of fish and concerns over sustainability. According to OECD-FAO, global fishmeal supply is likely to remain tight but stable in the future, except during El Niño years.

Fishmeal production



Note: India's production is plotted on secondary axis with scale of 1:10; E – estimated by FAO-OECD
 Source: OECD-FAO Agricultural Outlook 2021-30 and CRISIL Research

Fish oil production



Note: India's production is plotted on secondary axis with scale of 1:10; E – estimated by FAO-OECD
 Source: OECD-FAO Agricultural Outlook 2021-30 and CRISIL Research

2.4 Trend in India's fishmeal and fish oil (FMFO) exports

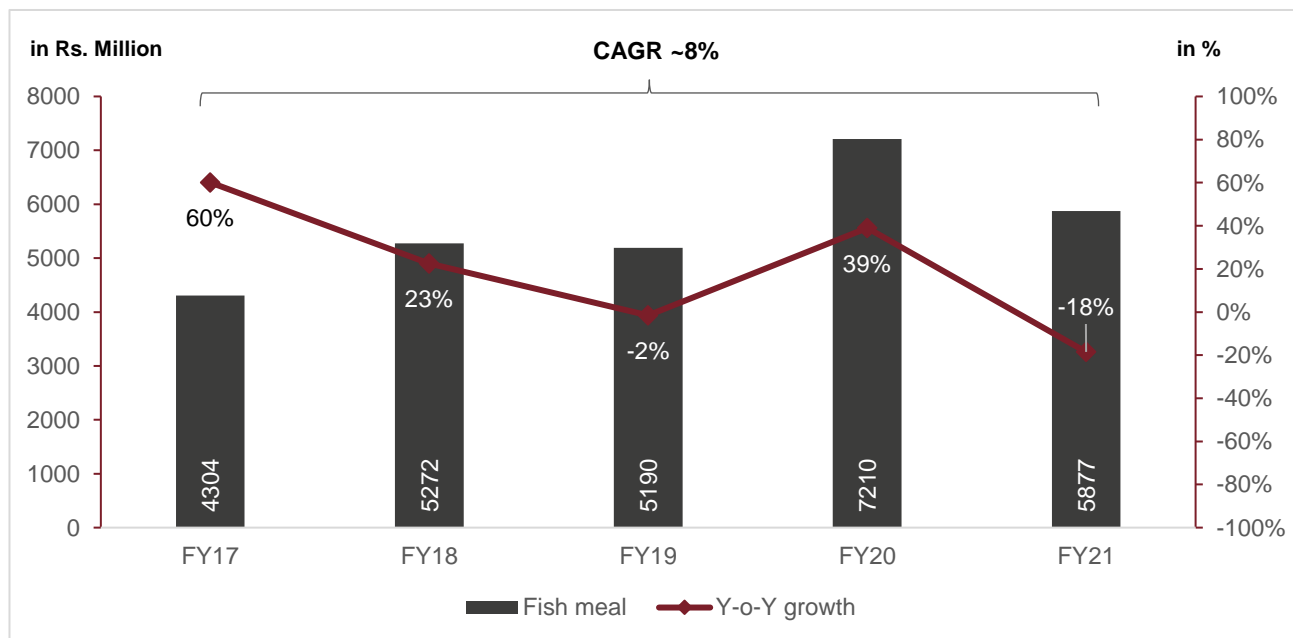
The Indian fishmeal and fish oil industry caters to both export and domestic markets. It is marked by seasonality. According to industry sources, the peak season for exports is from August to December-January. Export demand is dependent on production from the top 10 producing countries and inventory levels.

Indian fishmeal exports grew at 8% CAGR (value terms) from fiscal 2017 to fiscal 2021

In value terms, exports increased at ~8% CAGR from Rs 4,303 million in fiscal 2017 to Rs 5,876 million in fiscal 2021. In volume terms for fiscal 2021, fishmeal exports were ~70,000 tonnes in volume terms, up from ~54,000 tonnes in fiscal 2014, registering a CAGR of ~7% during fiscals 2017 to 2021. Growth has not been uniform across years, as exports are dependent on factors such as i) the catch during a year, which is affected by climate changes, and ii) the demand from domestic compound feed industry.

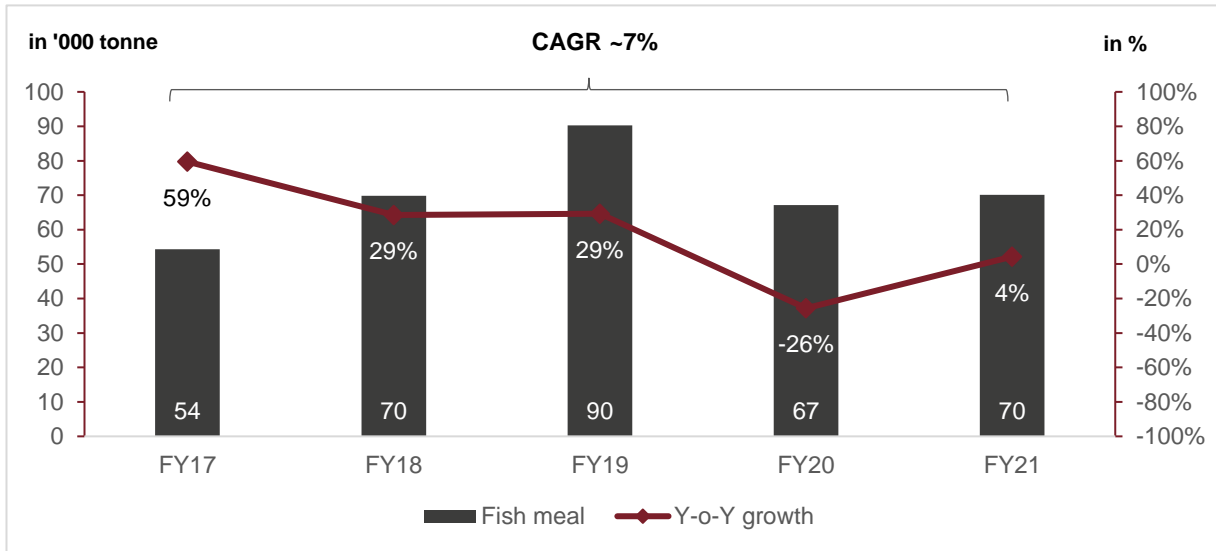
In 2020, though FMFO volume has declined drastically exports saw an uptick in value terms. This is due to poor performance of the second Peruvian fishing season leading decline in fish production from Peru region, creating a supply shortage causing an increase in prices. However, FMFO exports (in value terms) have declined in fiscal 2021 (value terms). This can be majorly attributed to higher fish production season for major exporting nations such as Peru and Chile along with lower prices provided by these countries when compared domestic FMFO prices.

India's exports of fishmeal in value terms



Source: DGCI&S, CRISIL Research

Exports of fishmeal in volume terms



Source: DGC&S, CRISIL Research

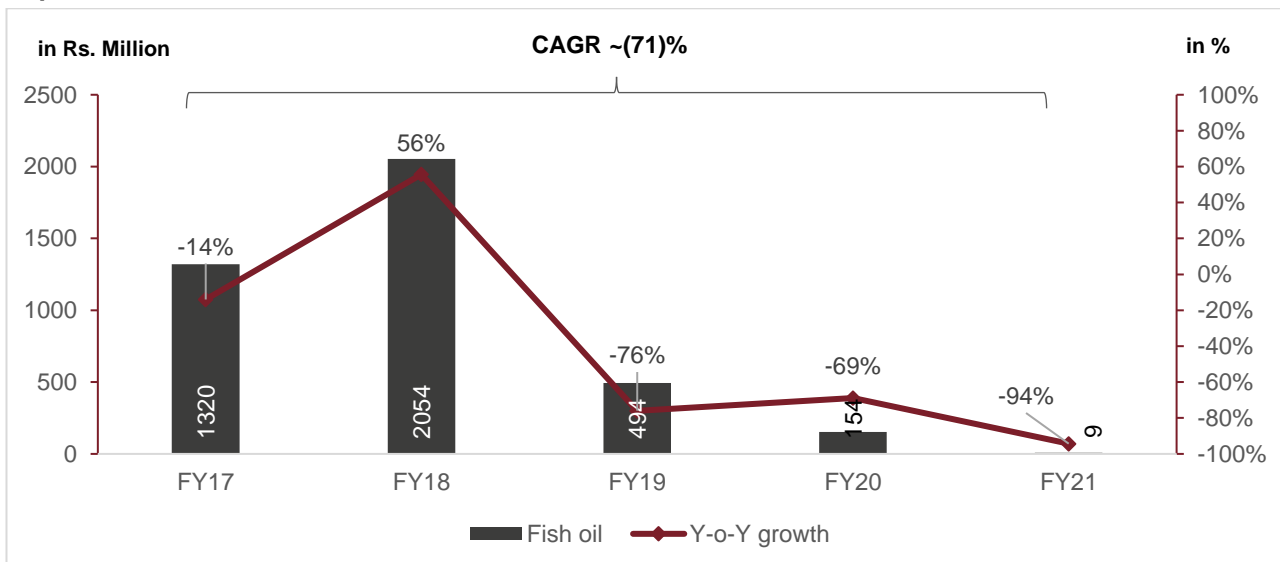
Indian fish oil exports (value terms) dipped drastically between fiscal 2017-21 due to reduced fish landings

Fish oil exports declined from Rs. 1,320 million in fiscal 2017 to Rs 9 million in fiscal 2020 at a CAGR of ~71%. Volume of fish oil exports also dipper at a similar rate as value. In volume terms, fish oil exports dropped from 15 tonnes in fiscal 2017 to 0.1 tonnes in fiscal 2020 at a CAGR of (70)%. Growth in fish oil exports was affected by species and quality of fish landings.

In case Fiscal 2018 saw rise in fish oil exports after declining in fiscal 2017, on account of improvement in oil sardine landing on the Indian coast.

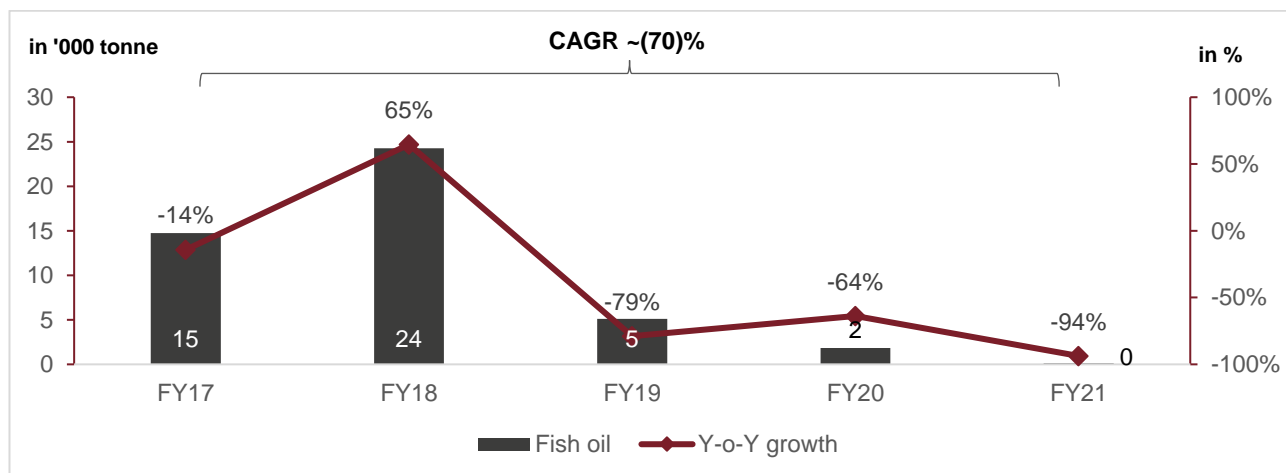
However, from fiscal 2019, reduction in fish landings stands as the major reason decline in exports. Fiscal 2019 saw drastic drop in fishmeal and fish oil exports on account of fall in sardine fish landings on Indian coast (~40% decrease from fiscal 2018 landings, as per CMFRI data).

Exports of fish oil in value terms



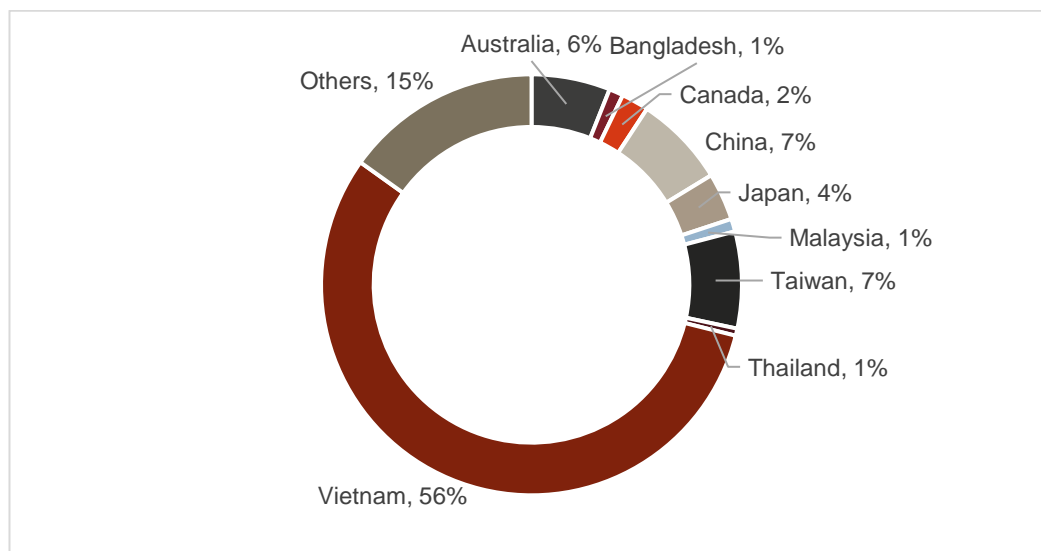
Source: DGC&S, CRISIL Research

Exports of fish oil in volume terms



Source: DGCI&S, CRISIL Research

Share of countries in Indian fishmeal and fish oil exports: as of fiscal 2021



Source: DGCI&S, CRISIL Research

India exports fishmeal and fish oil to the Asia-Pacific region - Vietnam, Taiwan, Bangladesh, Japan, Saudi Arab, Thailand, Australia, and Malaysia.

Since end of 2018, Indian players could cater to Chinese demand for fishmeal and fish oil

In November 2018, a protocol on hygiene and inspection requirements for the exports of fishmeal and fish oil from India to China was signed by the two countries, during the visit of Hu Wei, Vice Minister of General Administration of Customs of China (GACC). This will enable India to commence exports of fishmeal and fish oil to China. According to Indian press information bureau (PIB) notice dated November 28, 2018, India received clearance to export fishmeal and fish oil to China. A protocol on hygiene and inspection requirements for the export fishmeal and fish oil from India to China was signed on the day. As per International Trade Centre data for the period 2018, China imported fish oil to the tune of USD 183 million and fishmeal and allied products to the tune of USD 2,228 million.

2.5 Growth drivers for the industry

Fishmeal and fish oil are not only a rich source of protein and essential fatty acids (EPA and DHA), respectively, but also contain an optimal mix of vital nutrients and are easily digestible. The Fishmeal and fish oil are valuable and essential ingredient in the feed industry. Fishmeal and fish oil have been increasingly used in the aquaculture industry and the growth in aquaculture industry is driving prices of fishmeal and fish oil higher. Following growth drivers for the industry are detailed below:

Growth in compound animal feed market, especially aqua feed

India is one of the largest global producers of animal feed and the Indian compound animal feed market is growing at a fast clip. The industry is expected to record 3.5-4.0% CAGR, in value terms, between fiscals 2022 and 2025. Fishmeal is an essential feed element for the compound feed industry and, thus demand for fishmeal is expected to be strong going forward.

Within the animal feed market, during the same period, aqua feed is expected to grow fastest at 9-10% CAGR (value terms) driving higher growth for protein-rich feed such as fishmeal and fish oil. About 70-75% of fishmeal and fish oil demand is from the aquaculture industry. The aquaculture industry is expected to grow strongly on rising per capita fish consumption.

Government initiatives to support growth of aquaculture and fisheries industry in India

India is the second largest fish producer in the world and central government has recognised the fisheries sector as the 'sunrise sector'. In addition, this sector provides livelihood to 28 million people at primary level and twice the number across the value chain. In order to support the fisheries and aquaculture sector in India, Government has brought in various schemes such as PMMSY, FIDF and Kisan Credit Card. These schemes cumulatively aim at increasing fish production and the aquaculture exports from India, decrease the post-harvest losses. The PMMSY aims to achieve an annual production of 22 million metric tonnes by 2025 and increase the per capita consumption to 12 kg.

Furthermore, in the union budget of 2021, announcement for the development of 5 fishing harbors in the regions of Kochi, Chennai, Visakhapatnam, Paradip, and Petuaghat was made. Under this, Rs. 60 billion will be spent in order to develop the infrastructure facilities at these ports. As per PIB, Preparation of DPRs and Impact Assessment Study wherever required will be completed by 30th Sept, 2021 followed by sanction of the Projects by 31st December, 2021.

The above-mentioned initiatives by Government of India would bolster the growth in the aquaculture and fisheries industry, would inturn lead to growth of the FMFO industry as it acts major raw material for the production of fish feed which is used aquaculture industry.

Increase in demand for nutraceuticals – nutrients plus pharmaceuticals

Increasing health disorder due to sedentary lifestyle and poor habits has encouraged the use of nutraceuticals, which provide adequate supply of essential nutrients that helps lower the risk of diseases. Awareness and access to information and rising risk of health disorders have increased awareness about nutrition and healthy diet, which has led to an increase in demand for health supplements and nutraceuticals.

Omega-3 pills and related products derived from fish oil are gaining importance as high nutrient and healthy dietary supplements. As already mentioned, omega-3 fatty acids have various health benefits and support healthy functioning of the heart, brain, nervous system, eye, bones and joints. Along with supporting various body functions, they provide protection from numerous diseases. Dietary supplements and foods fortified with essential nutrients such as vitamins, iron and omega-3 acids are more in demand now.

2.6 Growth challenges for the industry

In spite of growing demand and importance of fishmeal and fish oil, the industry faces various challenges to cater to rising demand. The foremost challenge is volatile nature of raw material (fish) and adherence to sustainable fishing practices.

Limited and volatile supply of raw material

The Indian fishmeal and fish oil industry's annual turnover is dependent on the availability of fish. Indian oil sardine is key species used for production of superior grade of fishmeal and fish oil. By nature, the Indian oil sardine is prone to wide fluctuation in availability due to environmental factors. Environment has a direct impact on growth and reproduction of Indian oil sardine. Central marine fisheries research institute (CMFRI) in its study report on Indian Oil Sardine (IOS) remarks that various environmental factors affect biologically functioning (which includes growth rate, food availability, spawning failure etc) of fishes that impact the fish landing in coastal areas, both in terms of quality and quantity.

The impact of El Niño also cannot be ruled out. According to CMFRI, the IOS landing is impacted by the occurrence of El Nino effect. Though IOS decline is associated with onset and retreat of El Nino, the species recovers quickly on account of its medium to high resilience to exploitation on account of its inherent qualities like high fecundity (fertility), rapid growth, short generation turnover time and protracted spawning period. Over the previous years, IOS landing peaked in FY2013 post which it declined due to onset of El Nino. With the weakening of El Niño since FY2017 normal spawning activity resumed and marginal improvement in IOS landings was recorded in FY2018.

CMFRI Study also notes that fisheries management is important for ensuring sustainable exploitation of various fishery resources and even more for Indian oil sardine, which not only is an important food fish but also forms a forage fish in the marine food chain and is also a key raw material for the fishmeal and fish oil industry. Overall fish landings have increased in the last decade due improvement in fishing gears and mechanization of boats. Further analysis by CMFRI on IOS landings indicate that as of 2018 the stock level of IOS is almost fully exploited and there is little scope to increase the landing significantly by further increasing the effort. Efforts have to be in place to ensure sustainable exploitation of the stock without impacting the natural replenishment cycle.

Unsustainable fishing practices

Many companies have mushroomed in the past decade seeing growth opportunity with rise in the aquaculture and exports markets. Due to envisioned growth in aquaculture and simple in-principle manufacturing process many coast-specific small players have entered the fishmeal industry. This has led to rise in demand for fish at certain coasts, where supply is already limited by nature. Due to increased competition, unsustainable fishing practices have become rampant, leading to overfishing and depletion of fish population. Prices of raw material have been volatile, adversely impacting players' revenue and margins, especially for the smaller coast-specific players.

Working capital management is key, especially for smaller players

In India, fishing is generally carried out by the unorganised segment and small fishermen. Procurement of fish has to be on a low credit basis with an immediate payment cycle. Also, fishing peaks during 3-4 months post monsoon season. Thus, procurement largely takes place for 3-4 months only. This raises inventory and the requirement of working capital. Moreover, in the fishmeal and fish oil industry, smaller local players have low bargaining power when it comes to large compound feed industry players, who are the chief customers. To retain customers they need to provide additional facilities such as high credit period apart from good quality product. Additionally smaller coast-specific players, on account of their scale of operation, have low bargaining power in terms of access to raw material (marine fish), as compared to large established players. All these conditions necessitate proper working capital management. As per industry interactions, due to the above mentioned factors many smaller coast-specific players have had to stall or scale down production. Though schemes such as Kisan Credit Card (KCC) have been

brought by the government under union budget FY 2018-19, to meet the working capital requirements of farmers, its penetration remains a key monitorable.

Development of alternative feed sources, albeit in nascent stages

Fishmeal and fish oil production cannot sustain the growing aquaculture industry as the supply of fish for fish meal is limited, being a natural resource. Consequently, feed formulators are looking to reduce their reliance on fishmeal. Alternative feeds, which can substitute fishmeal as a protein source, are being developed. As per IFFO data, the share of marine ingredients in fish feed formula have declined moderately since 1990s to include more of plant source proteins. Developments in plant-based and insect-based products are currently in nascent stages, however their availability on a larger scale will remain a key monitorable.

Insect feed as meals consists of high amount of protein content and presence of essential amino acids and other lipids. These insect feeds are blended with respect to the targeted animal. Being a rich source of nutrients, this insect feed is used in various segments such as poultry, pet foods and aquaculture. Currently, insect feed is majorly used in pet food. Thus, the growth of insect feed depends upon the adaptability of insect feed in pet food segment and other animal feeds, where currently insect feed usage is limited

2.7 Government regulations impacting the industry

Important for the industry to comply with regulations on fishing activities

The Marine Fishing Regulation Act (MFRA) has been in place since the 1980s and all the maritime states have several management/regulation measures for marine fisheries. Relevant regulations on the zonation/demarcation of fishing areas for different categories of gear types, closed fishing season, restrictions on the use of destructive fishing gears, etc. are clearly indicated in the MFRA. Mesh size regulations are stipulated in this act and under state fisheries acts. Juvenile fishing was banned in August 2015 and the CMFRI recommended a minimum size of 10 cm of Indian oil sardines and 14 cm for Indian mackerel.

Apart from direct regulations on fishing, various environment laws are also applicable for fishing activities. Environment (Protection) Act (1986), being an umbrella act containing provisions for all environment related issues, includes the Water (Prevention and Control of Pollution) Act (1974) and the Wild Life Protection Act (1972) which is applicable to the fisheries industry.

Export regulations

The Marine Products Export Development Authority (MPEDA) necessities registration of exporters, fishing vessels and other processing entities under Section 9(2) (b) and (h) of the MPEDA Act, 1972 for exporters of marine products.

There are no direct and separate regulations pertaining to the fishmeal and fish oil industry, but the industry has to comply with standards and regulations required by export and domestic customers. For instance, Europe has its own set of regulations and standards for exports; Indian plants have to be approved by European agencies before exporting. In November 2018, India received clearance to export fishmeal and fish oil to Chinese market.

Accordingly players need to have certification and accreditation from General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) in order to conduct any export trade with China.

Compliance with sustainable procurement practices to gain importance, going forward

Apart from approvals and certification by export regulating authorities, the players in the industry also need to comply with sustainable and responsible fishing activities. Due to growing importance on sustainable procurement of raw materials, many organisations, (both feed and fishmeal & fish oil producers) are keen on procuring goods

only from suppliers who comply with certified sustainable supply practices. One such initiative is the IFFO Global Standard for Responsible Supply (IFFO RS), which is a business-to-business third party audited certification programme that assures stakeholder (including the animal feed, food and nutraceuticals value chains) responsibly source raw materials and manufacture fishmeal and fish oil products. With growing importance of sustainability, especially in the developed markets, Indian exporters may have to comply with such sustainable practice to cater to the developed markets. Industry interactions indicate that some players have already initiated the process to gain requisite compliance certification, in order to remain competitive in the global scenario.

Limited supply of raw material necessitates introduction of regulations on fishmeal and fish oil

Production of fishmeal and fish oil is highly dependent on the fish landing quantity and quality in a particular seasons. It is nature-dependent. To ensure an ecological balance, measures are being taken to ensure sustainable fishing and avoid over-fishing. Over-fishing may increase the output for one season but it may affect the availability of fish in the long run.

Measures such as a quota system for fishmeal and fish oil producers on the quantity of fish catch utilised for production in a particular season have helped keep a check on over-fishing. In Peru and Chile, quotas are provided according to the approved capacity of fishmeal and fish oil plants, which ensures sustainable fish catch and protects the industry from uncontrolled competition. Such quota system is currently not implemented in India.

In Kerala, minimum fishing size has been implemented since 2015 by agencies so that juvenile fish are not caught, and breeding is not disrupted by over-fishing. Only adult fish can be caught.

CMFRI and MPEDA recommend a precautionary approach to fishing along with adherence to regulations on avoiding fishing of juveniles, using the stipulated mesh size in the nets and recommended engine horsepower of crafts that can lower fishing mortality rates. According to industry interactions, quota on catches per trawler, quota on capacity-wise procurement of fish and production of fishmeal and fish oil, sustainable practices for fishing activity, and prevention of indiscriminate dumping of toxic materials, industrial effluents and sewage should be taken up by India to promote and conserve fisheries and the related industries.

3 Overview of the global animal feed industry

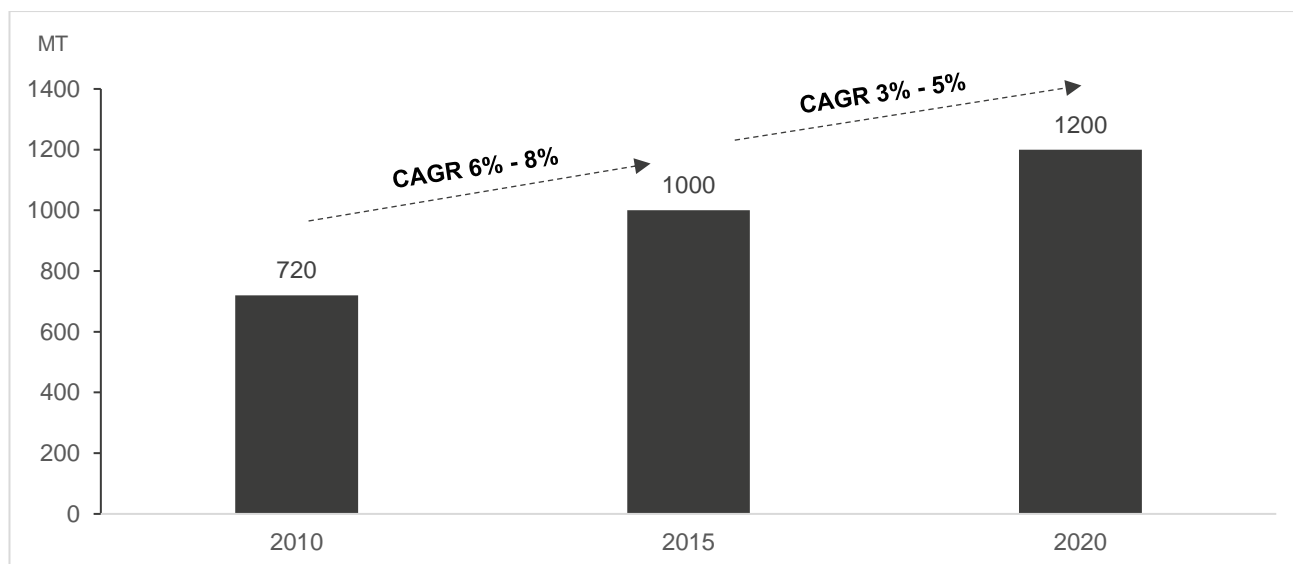
Global animal feed industry generated more than 400 USD billion revenues in CY 2020

The animal feed industry enables economic production of livestock animals throughout the world and thus plays a prominent role in the global food industry. The animal feed industry supports generation of animal food and protein products. According to the International Feed Industry Federation (IFIF), global commercial feed manufacturing industry or the compound animal feed industry has generated an estimated revenue in excess of \$400 billion in CY 2020.

Global animal feed industry produced ~1.2 billion tonnes of feed in CY 2020

As per IFIF, global compound animal feed production grew at 5-6% CAGR between CY 2010 and CY 2020, to 1.2 billion tonnes.

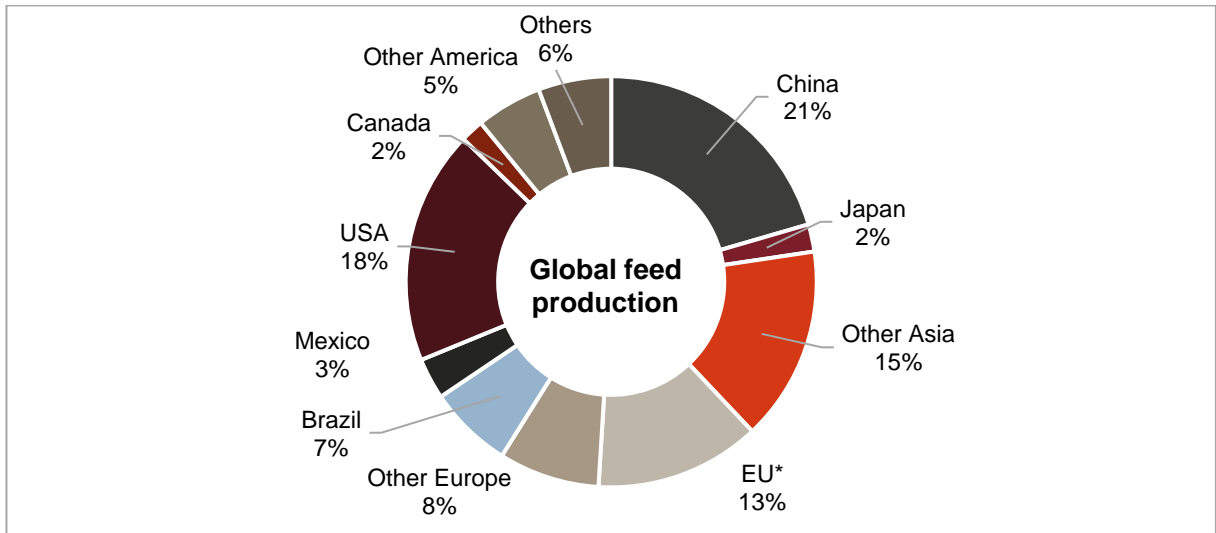
Industry size of global animal feed (volume terms)



Source: International Feed Industry Federation, CRISIL Research

In volume terms, China was the largest producer of animal feed (21% share) in CY 2020, followed by the US (18%) and the EU (13%). Other Asian countries, including Japan, together accounted for 17% share.

Global feed production (CY 2020)



Note: *: UK is not a part of EU

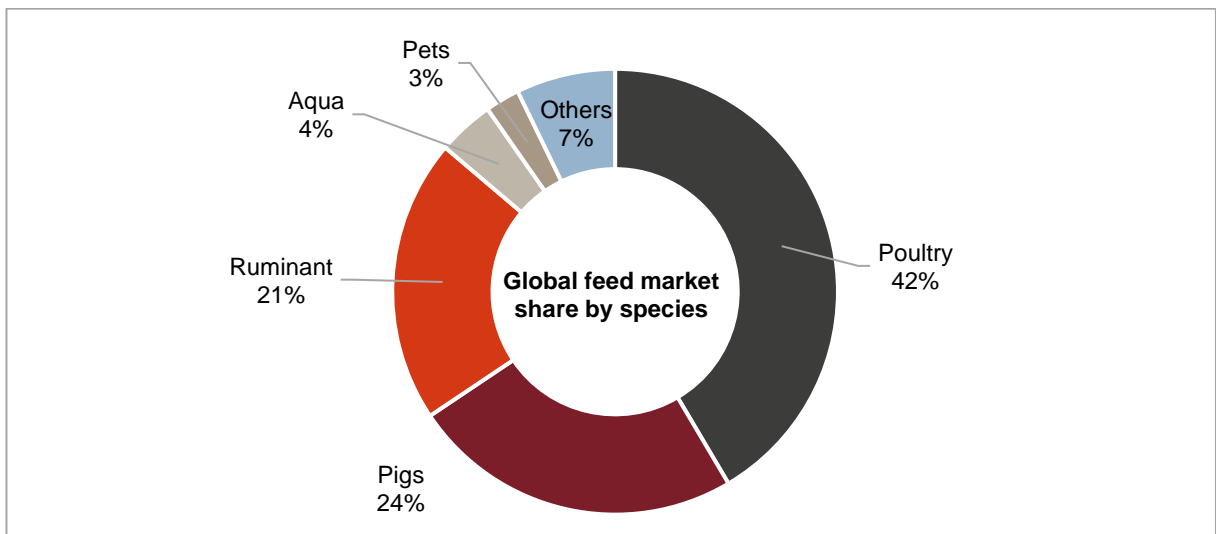
Source: International Feed Industry Federation, CRISIL Research

Growth in global animal feed driven by developing nations

IFIF has observed that growth of the animal feed industry is largely from developing countries, with production in developed countries relatively stable. IFIF expects the trend to continue, with growth coming from developing countries such as Brazil, China, India, and Latin American and Caribbean regions.

Growth of the animal feed industry will be fuelled by rising global demand for animal protein food. Over the past decade, there has been an increase in demand for animal protein, including livestock, dairy and fish, as more people are opting for animal nutrient diet. As seen from the chart, poultry and pig feed comprised the dominant shares in the feed industry as of CY 2020. However, by CY 2050, while poultry will still be the highest growth category on account of higher production volume, but aquaculture feed is expected to pick up and be the next fastest growth category as global demand for fish protein rises.

Poultry contributes to nearly half of global compound animal feed (as of CY 2020)

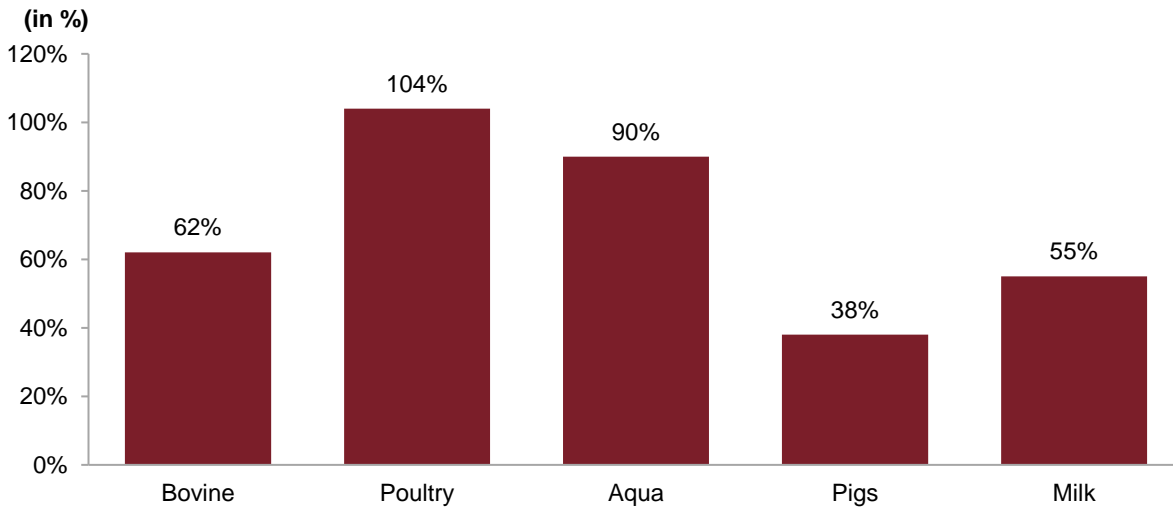


Source: IFIF estimates, CRISIL Research

Poultry and aquaculture to drive growth for animal feed

The United Nations Food and Agriculture Organization (FAO) estimates food demand to grow by 60% by CY 2050. Accordingly, between CY 2010 and CY 2050, the production of animal proteins is expected to grow by ~1.7% per annum, with meat production projected to rise by ~70%, aquaculture by 90% and dairy by 55%.

Projected absolute growth in animal protein source from 2010 to 2050



Source: FOA global food outlook, CRISIL Research

Demand from aquaculture farms to boost fish feed and allied industries

The anticipated growth of the aquaculture industry is expected to drive growth of the fish feed and allied industries, which can be seen from the growth rate in exports.

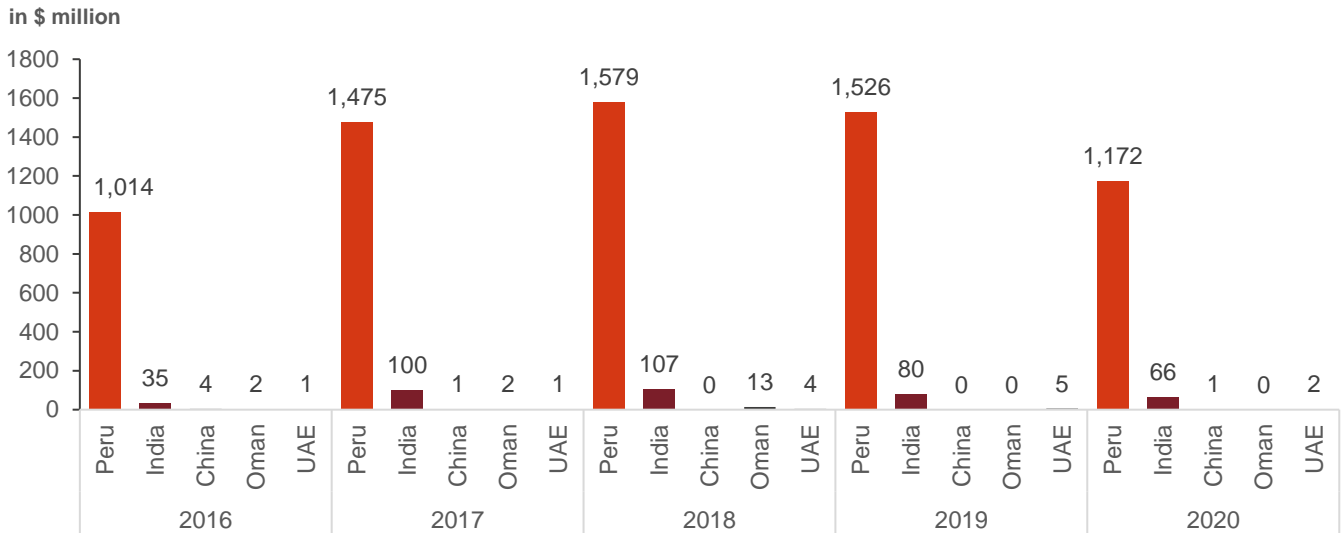
China, Chile, Denmark, Iceland, India, Japan, Norway, Peru, Thailand, the US and Vietnam are key producers of fishmeal and fish oil. China primarily utilises fishmeal for the domestic industry. In fact, China is a net importer of fishmeal, largely for its aquaculture farm and feed industries.

As per IFFO data, Peru is the leader in fishmeal and fish oil production, as it has the largest and superior quality oil fish along its coast. Due to low domestic consumption, the produced fishmeal and fish oil are sold in global markets.

In European Union, Norway and Denmark are the major producers of fishmeal and fish oil. Norway is the largest consumer of fishmeal and fish oil, among the global nations, due to its aquaculture production.

As per industry interactions, India is not a major exporter of fishmeal and fish oil when compared with the top 10 countries. On average, Indian fishmeal and fish oil grade contains lower protein as compared with the Peruvian grade, owing to limited availability of high quality oily fish along its shores. The country's main export markets for fishmeal and fish oil are Australia, Bangladesh, Japan, Malaysia, Saudi Arabia, Taiwan, Thailand and Vietnam.

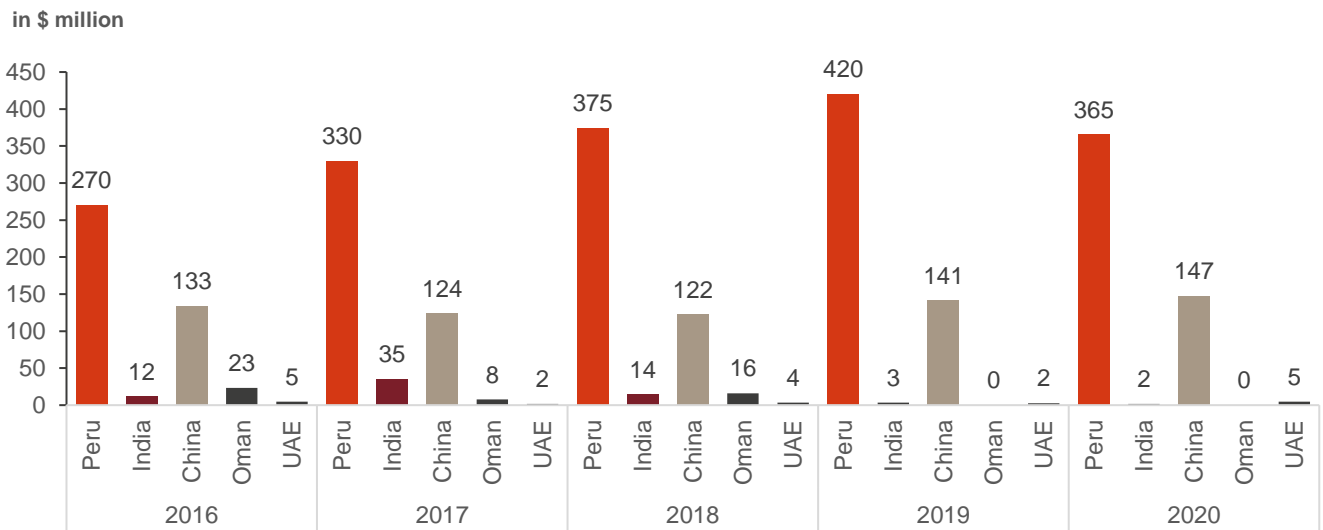
Export of fishmeal from select countries



Note: Six digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 230120.

Source: UN Comtrade, CRISIL Research

Export of fish oil from select countries



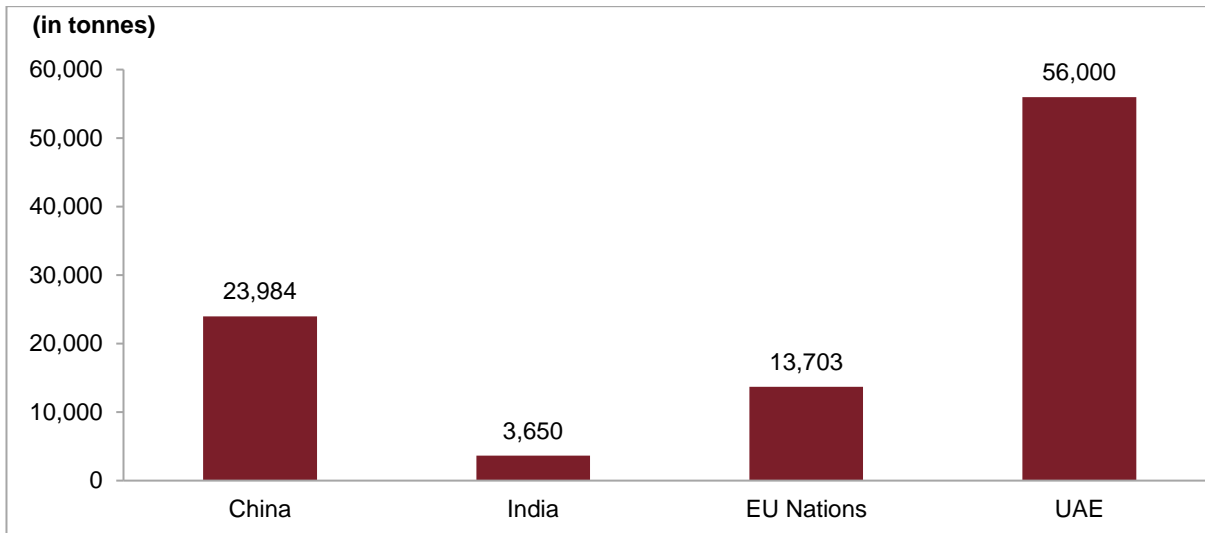
Note: Six digit HS code from UN Comtrade is considered to arrive at the export figures; HS code used is 150420.

Source: UN Comtrade, CRISIL Research

Production and consumption of poultry meat low in India vis-à-vis global

India produces very low volume of poultry meat as compared with another countries. India's poultry meat production as per CY 2021 estimates is 3,650 tonnes as against 23,984 tonnes in China. In the EU, poultry meat production was 13,703 tonnes. The UAE had the largest production of poultry meat at ~56,000 tonnes in CY 2021.

Production of poultry meat in select countries (CY 2021E)

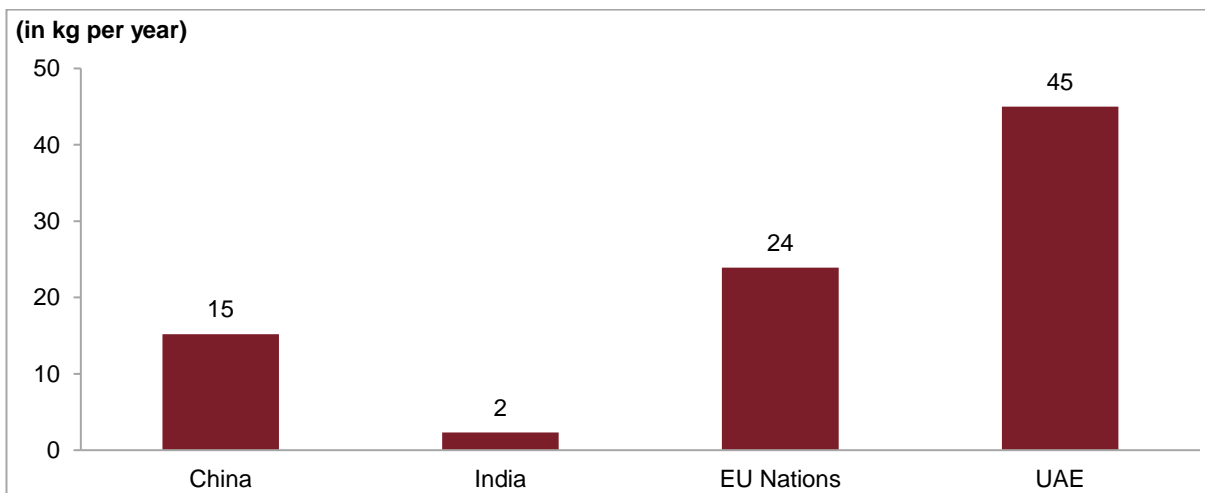


Source: FAO – OECD Agriculture outlook 2020 -2031, USDA for UAE figures, CRISIL Research

Also, the per capita consumption of poultry meat at ~2 kg per year per person in India as of CY 2021 estimates is lower among the selected countries; however, the vast difference between the present per capita consumption at ~4.2 kg of overall meat consumption and the National Institute of Nutrition recommended level at ~11 kg of meat offers an excellent opportunity for growth of the poultry industry.

The per capita consumption of poultry meat was the highest in UAE and EU as of CY 2021 estimated at 45 and 24 kg per capita respectively, followed by China at 15 kg.

Per capita consumption of poultry meat in select countries (CY 2021E)



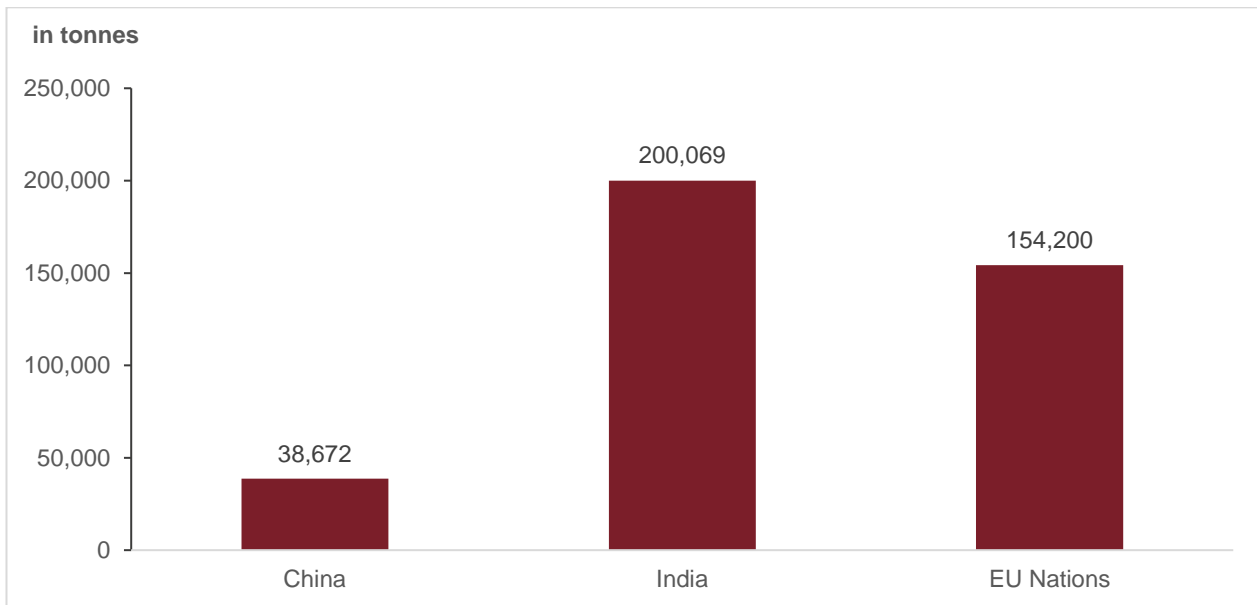
Note: Poultry consumption for the UAE is inclusive of consumption by tourists (UAE has population of 9.9 Mn with tourist population of ~6-7 Mn in 2021. Pre-Covid tourist visits were 16.7 Mn in 2019)

Source: FAO – OECD Agriculture outlook 2021 -2030, USDA for UAE figures, CRISIL Research

India is the largest producer of milk and dairy products among China, EU Nations and UAE

India leads when it comes to milk production and per capita consumption of fresh dairy products among China, EU Nations and UAE. India’s milk production is ~200,069 tonnes as per CY 2021 estimates, ahead of the EU, which is 154,200 tonnes. China is not a major producer of milk, producing just ~38,672 tonnes of milk during the same period.

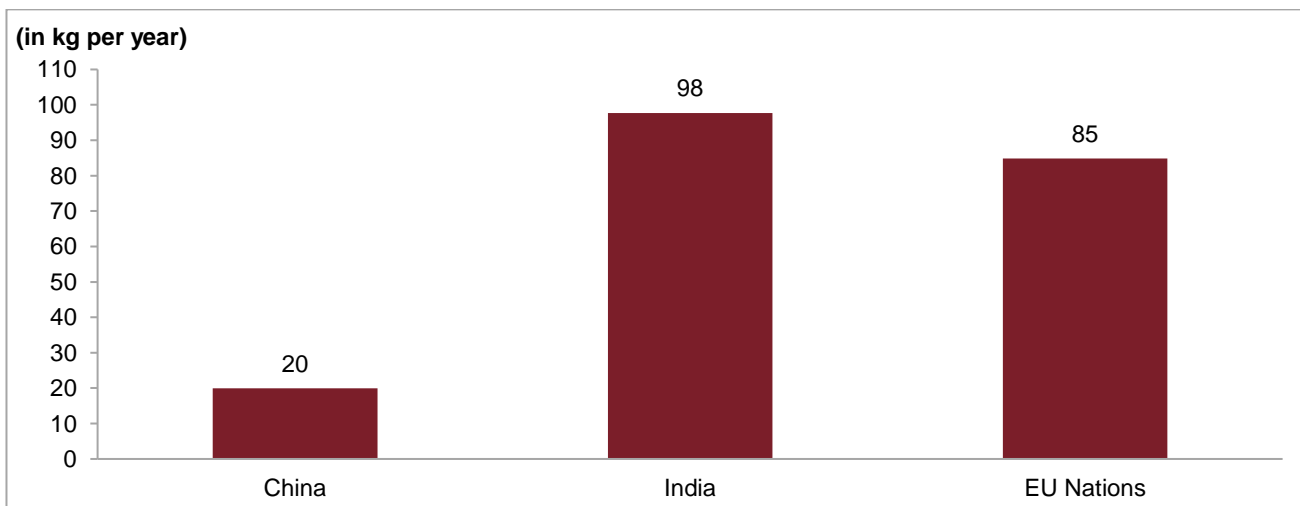
Production of milk in select countries (CY 2021E)



Source: FAO – OECD Agriculture outlook 2021 -2031, CRISIL Research

The per capita consumption of fresh dairy produce in India is highest among the compared nations at 98 kg per year followed by EU at 85 kg per year as per CY 2021 estimates. China has very low per capita milk consumption ~20 kg per year during the same period.

Per capita consumption of fresh dairy produce in select countries (CY 2021E)

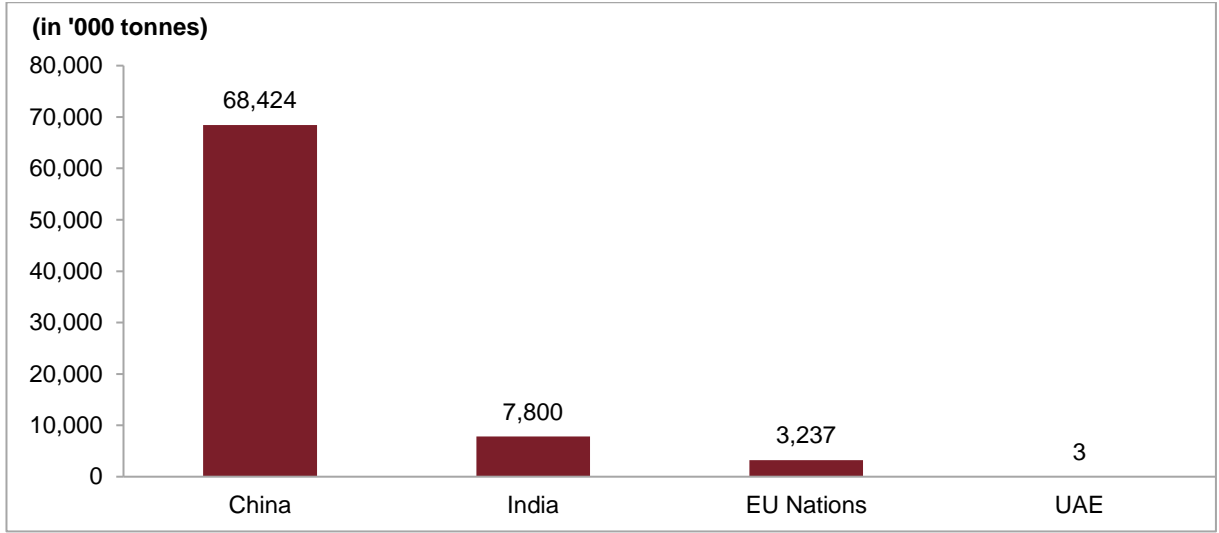


Source: FAO – OECD Agriculture outlook 2021-2030, CRISIL Research

China is the leading producer and as well as leading consumer of seafood (including aquaculture)

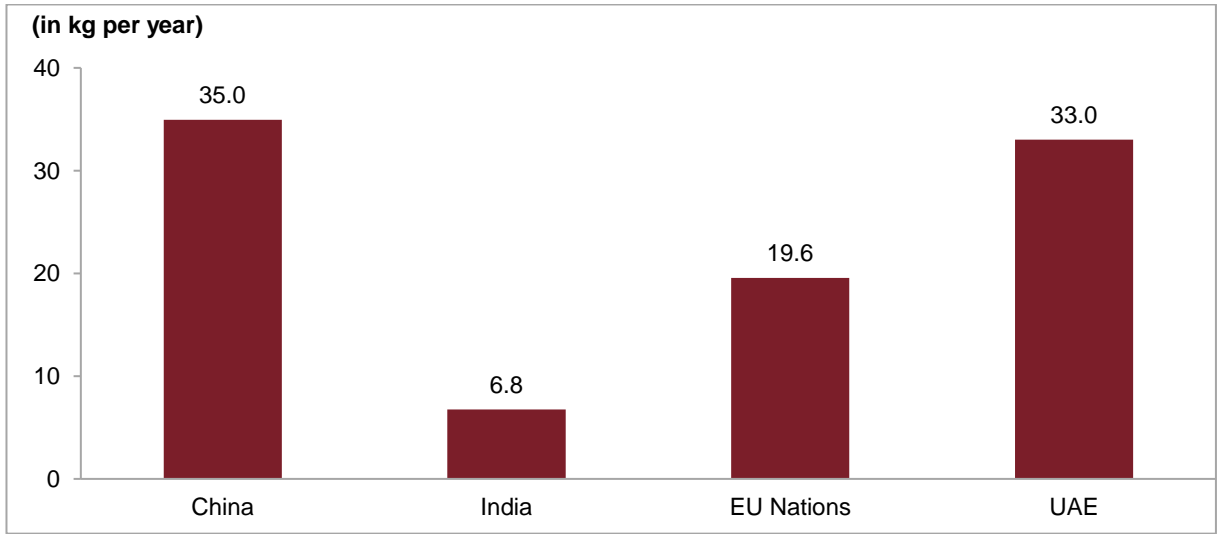
India produces more aquaculture meat than poultry meat. India's aquaculture production (excludes wild catch) stood at 7,800 thousand tonnes in CY 2019 as per FAO data. However, this figure is dwarfed by China, where production was 68,424 thousand tonnes. Production in the EU was 3,237 thousand tonnes and for UAE it was 3 thousand tonnes in CY 2019. Aquaculture industry in UAE is witnessing growth as it is focusing to reduce dependency on imports for seafood.

Production of aquaculture in select countries (CY 2019)



Note: latest data available is as of 2019
Source: FAO, CRISIL Research

Per capita consumption of seafood in select countries (CY 2021E)



Source: FAO – OECD Agriculture outlook 2018 -2027, CRISIL Research

China is the leading producer of aquaculture meat and a leading consumer as well, with per capita consumption of seafood at 35 kg per year as of CY 2020 estimates and 34% share in the global seafood consumption basket.

Despite higher aquaculture production vis-à-vis the EU, India lags the EU when it comes to per capita consumption of seafood. As per CY 2021 estimates, India's per capita consumption of seafood was 6.8 kg per year as compared with the EU's ~19.6 kg.

Also, while India's seafood consumption is higher than poultry meat consumption, the country ranks much lower as compared with the world average of ~21 kg, indicating significant scope for growth. UAE has the highest per capita consumption of seafood, 33 kg in CY 2020, within the gulf countries. Most of UAE's demand for seafood is met by imports.

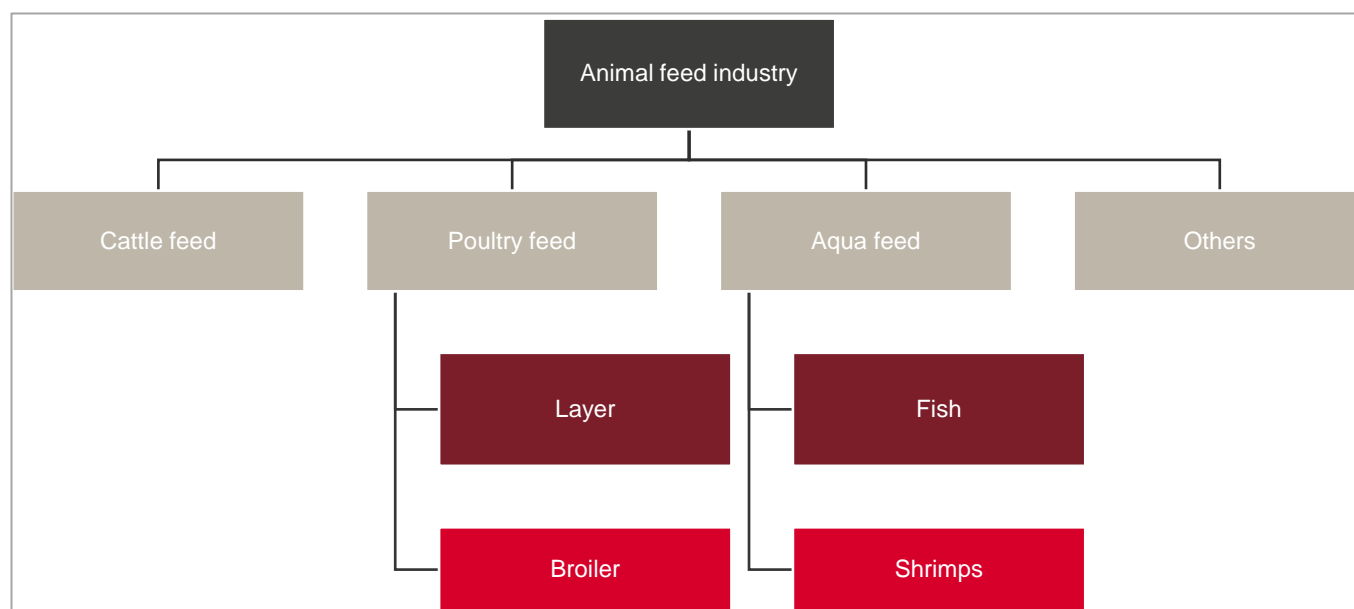
Global per capita seafood consumption has been rising steadily over the past decade. Increasing preference for seafood in developed countries owing to its health benefits is expected to increase the global per capita consumption of seafood to 18.6 kg per capita by CY 2030.

4 Overview on animal feed industry in India

4.1 Indian animal feed industry among fastest growth compound feed markets

India's animal compound feed industry has recently emerged as one of the fastest growing compound feed markets in the world. Increasing livestock population and growth in end-user industries have contributed to the growth.

Classification of animal feed industry



Note: Others include horses, pigs, cats, dogs, etc.

Source: CRISIL Research

CRISIL Research has estimated that the animal compound feed industry in India was Rs 1,235-1,255 billion in fiscal 2022. In volume terms, India is one of the largest producers of animal feed, with an annual production of 35.3-37.7 million metric tonnes.

By fiscal 2025, the industry is expected to record 3.5-4.0% CAGR and reach Rs 1,420-1,450 billion. Among the three segments, aqua feed is expected to grow the fastest at 9-10% CAGR, followed by poultry feed and cattle feed at 3.5-4.0% CAGR and 7-7.5% CAGR, respectively.

Size of India's animal compound feed industry

Feed segment	Industry size by volume as of FY22E	Industry size by value as of FY22E	Industry size by volume as of FY25	Industry size by value as of FY25	Volume CAGR FY22-25P	Value CAGR FY22-25P
	(million MT)	(Rs billion)	(million MT)	(Rs billion)		
Poultry feed	23-25	910-920	26.5-28.5	1,015-1,025	4.5-5.0%	3.5-4.0%
Cattle feed	10.6-10.8	235-240	12.7-13.2	290-300	6.5-7.0%	7.0-7.5%
Aqua feed	1.7-1.9	90-95	2.1-2.3	115-125	7.0-7.5%	9.0-10.0%
Total	35.3-37.7	1,235-1,255	41.3-44.0	1,420-1,450	3.5-4.0%	3.5-4.0%

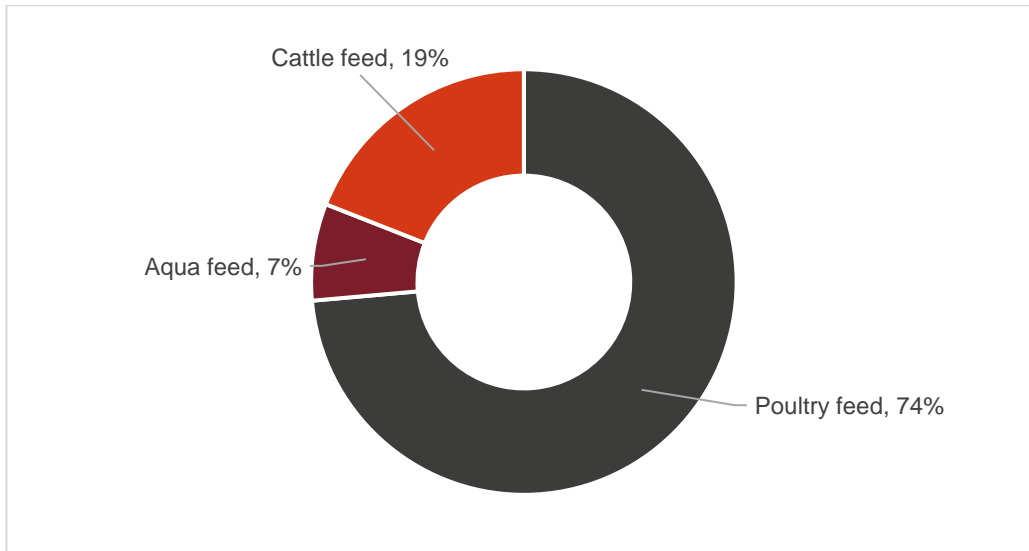
Note: CRISIL Research has considered only cattle, poultry and aqua feed segments while arriving at market size of Indian animal compound feed industry.

Source: CRISIL Research

The poultry feed industry constitutes nearly three-fourth of the overall feed industry, owing to high penetration of compound feed. In contrast, the share of cattle feed is just 19% despite India being the largest milk producer. This is largely because farmers rely on grazing as a means of feed, and the penetration of compound feed has remained low.

The aqua feed segment, which currently has a 7% share, is driven by increased usage of shrimp feed. And as shrimp cultivation is largely organised, it has had a cascading effect on the consumption of shrimp feed.

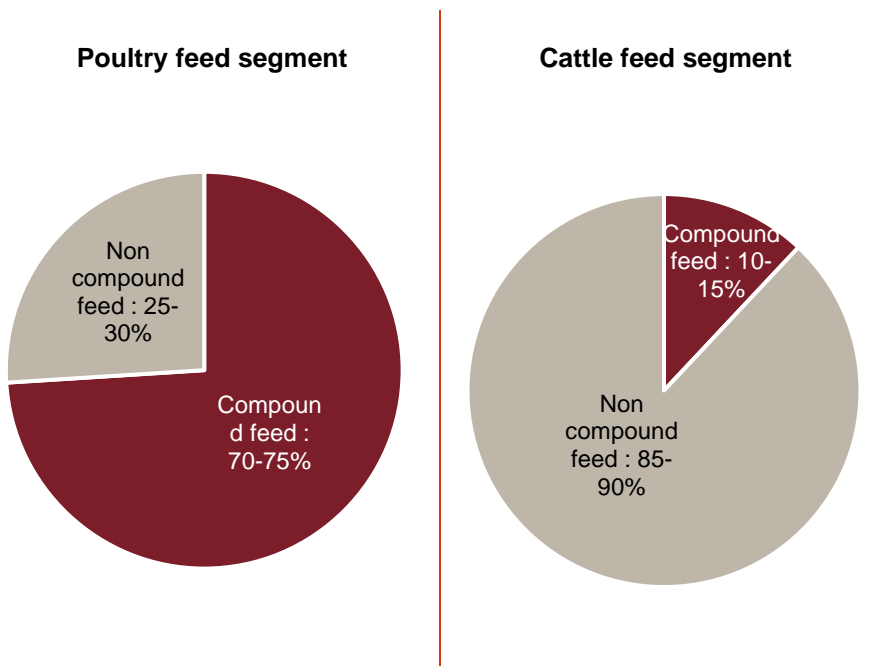
Segment-wise share of animal feed industry in India (value terms) as of fiscal 2022E



E: Estimates, Source: CRISIL Research

Poultry feed segment has a higher share of compound when compared to cattle feed. As mentioned earlier as farmers continue to rely on grazing as a means of feed, and the penetration of compound feed has remained low in cattle feed segment at 10-15% of the total cattle feed market. It is the unorganised industry that relies heavily on non-compound feed in cattle segment.

Share of compound feed in animal feed industry

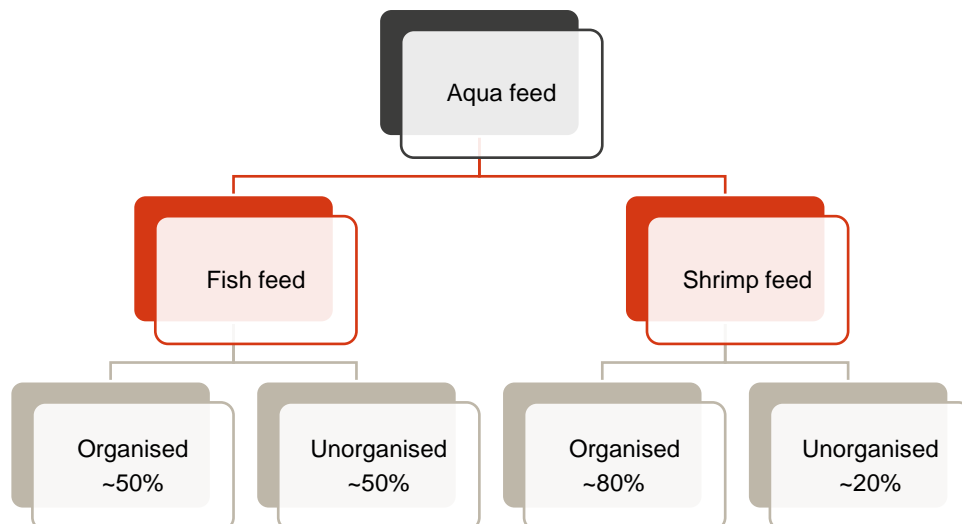


Source: CRISIL Research

4.2 Aqua feed industry in India

Aqua feed industry comprises shrimp and fish feed

The aqua feed industry can be classified into fish feed and shrimp feed. The shrimp feed segment is largely organized as the shrimp industry caters to the export market. Given that a large part of the shrimp exports market is catered to by aquaculture, the usage of shrimp feed has been higher. On the other hand, wild catch still comprises a significant share in case of fisheries, leading to a lower share of organized fish feed segment.



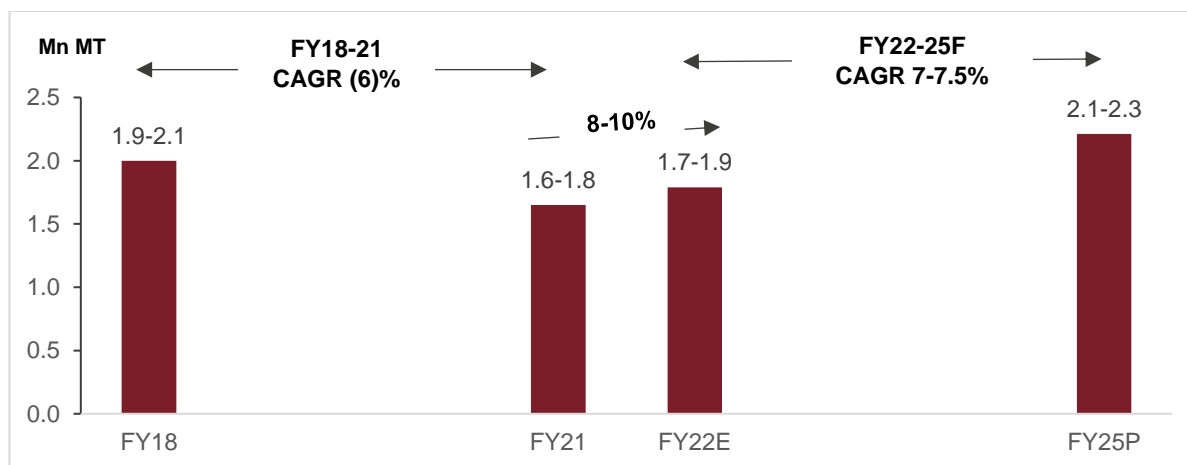
An important part of modern commercial aquaculture is compound feed that provides a balanced nutrition needed by farmed fish and shrimps. Feed is manufactured in the form of pellets because:

- There is less wastage of feed in pelleted form
- Pellets are nutritionally richer
- As pellets are cooked, it is easily digestible

From fiscal 2018 to 2021, CRISIL Research estimates the aqua feed industry de-grew at ~6% CAGR to 1.6-1.8 million tonnes. Over the period, value-wise, the industry size also de-grew from Rs. 90-95 billion to Rs 70-75 billion. This de-growth can be majorly attributed to the covid-19 induced lockdowns coupled with supply chain disruptions leading to reduction in shrimp production during the fiscal 2021 in turn effecting the shrimp feed, thus slowing down the overall growth

However, going forward, the volumes are expected to grow at a CAGR of 7-7.5% from fiscal 2022 to 2025 reaching an overall volume of 2.1-2.3 million tonnes

Trend of organised aqua feed industry in India (volume terms)



E: Estimate, P: Projected

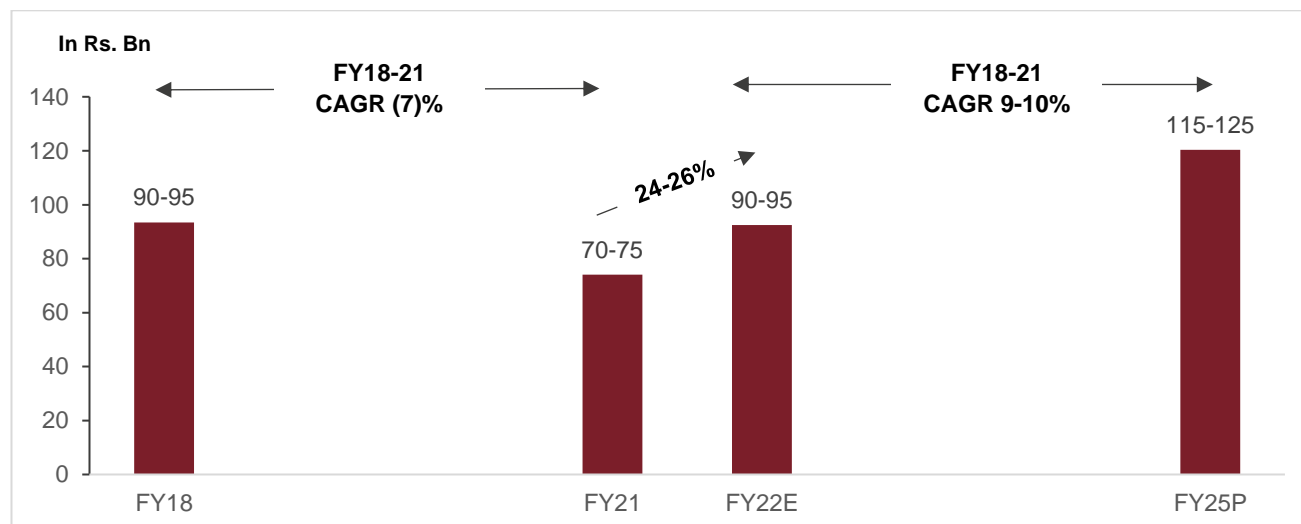
Source: CRISIL Research

Domestic aqua feed market to grow at CAGR 8-10% over fiscal 2022-25 in value terms

CRISIL Research projects aqua feed industry, in value terms, to grow at a CAGR of 9-10% from fiscal 2022 to 2025 reaching a value of Rs. 115-125 billion.

Growth of the aqua feed market will be driven by rising demand of shrimp feed, owing to increasing consumption of shrimps. A growing population, increasing per capita consumption of fish and shift towards organised feeds is expected to propel growth.

Trend of organised aqua feed industry in India (value terms)



E: Estimate, P: Projected

Source: CRISIL Research

Growth driver and challenges

Fish production on a steady growth trajectory

Growth of the aquaculture fisheries industry can be attributed to stagnation in capture fish, as a result of wasteful practices followed by fishermen. Overfishing, trawling in coastal areas, and low technological sophistication in fishing practices have substantially lowered yields from marine fishing. The shift towards aquaculture has been a major growth driver for the fish feed industry.

Increasing global demand for shrimp

Shrimps are among the most popular seafood in the Europe, Japan and the US. Strong demand from these markets has led to a significant increase in aquaculture activity in India. Over the past decade, from fiscal 2012 to 2021, Shrimp exports from India, recorded a 17% CAGR in value terms, and 13% CAGR in volume terms.

Government support for aquaculture

The Indian government has various schemes for export promotion of fisheries through the Marine Products Export Development Authority. These schemes can be classified into:

- Export production in capture fisheries
- Export production in culture fisheries
- Induction of new technology, modernisation of processing facilities and development of infrastructure
- Market promotion

Rising per capita seafood consumption

Global per capita seafood consumption has been rising steadily over the past decade. Increasing preference for seafood in developed countries owing to its health benefits along with sustained growth in demand is expected to translate into increase in per capita consumption of seafood to 18.68 kg per capita by CY 2030, from 17.94 kg per capita as per 2021 estimates.

Development of aquaculture farms

India offers a huge potential for aquaculture development. The country has an extensive river and canal system of ~195.210 km, comprising 14 major and 44 medium rivers, and numerous small rivers and streams. In addition, pond and tank resources are estimated at 2.36 million ha.

Because of limited nature of wild catch fish, there is an increase in demand for fish cultivation and aquaculture fisheries

Income growth

Rising income levels and health awareness (white meat is considered to be healthier than red meat) globally is likely to increase the preference for seafood over other lower-cost dietary protein sources (white and red meat).

Aquaculture diseases pose challenge to fish culturing

Diseases also pose a major risk to aquaculture, as diseases can wipe out a huge quantity of fish. Aquaculture breeding and maintenance of huge quantity of fish in small areas create a conducive environment for the development and spread of infectious diseases. Maintaining good environment, using hygienic and nutritious feedstock, and preventing deterioration of water will help prevent the breakout and spread of diseases.

Key government regulations impacting the aqua feed industry

Any government regulation affecting the seafood industry will have a direct impact on the aqua feed industry.

Strong institutional network helping growth of seafood industry in India

In order to provide support to the seafood industry, the government set up the National Fisheries Development Board (NFDB) in 2006 with its headquarters in Hyderabad. This was done with the aim of studying the potential of the seafood sector, processing and marketing of seafood, and application of modern research and development (R&D) tools to optimise seafood production and productivity.

The Coastal Aquaculture Authority, a statutory body established by the Coastal Aquaculture Authority Act, 2005, regulates coastal aquaculture activities to ensure sustainable development without damage to the coastal environment. It is empowered to create regulations for the construction and operation of aquaculture farms in coastal areas, inspection of farms to ascertain their environmental impact, registration of aquaculture farms, fixing of standards for inputs and effluents, and removal or demolition of polluting coastal aquaculture farms.

At the central level, several key laws and regulations govern the aquaculture industry:

- Indian Fisheries Act, 1897 – It includes provisions for penalties applicable to activities such as killing of fish by poisoning water and using explosives, and fishing in privately owned waters. Additionally, fish protection methods exist to regulate fishing devices (net, mesh sizes and traps).
- Environment (Protection) Act, 1986 – It is an umbrella Act containing provisions for all environment related issues.
- Water (Prevention and Control of Pollution) Act, 1974, and Wildlife Protection Act, 1972 – Both include provisions applicable to aquaculture.

In December 1996, the Supreme Court of India issued an order prohibiting the construction/set up of shrimp culture ponds within coastal regulation zones and within 1,000 m of Chilka Lake and Pulicat Lake, with the exception of traditional and improved traditional types of ponds.

It also ruled that an authority should be constituted to protect ecologically fragile coastal areas, seashore, waterfront and other coastal areas, especially to deal with the situation created by the shrimp culture industry in coastal states/union territories. Consequently, the Aquaculture Authority was established in accordance with the

Environment (Protection) Act, under the Ministry of Agriculture. It issues guidelines related to various environmental issues, including effluent discharge, sustainable development, and loss of biodiversity.

Apart from these national schemes, there exist various state-level schemes.

Increase in import duty on fish and prawn feed to 15%

Feeds form one of the major parts of shrimp farming as they contain the proteins required for the growth of shrimp. In order to further push the aquaculture industry in the country, Government of India has increased the import or customs duty on the prawn feed and fish feed in pellet form from 5% to 15%. In fiscal 2021, as per MPEDA, India has exported 5,90,275 tonnes of shrimp with an value of Rs.325.2 billion.

Government Initiatives – effort to support fisheries and aquaculture industry

In order to support the fisheries and aquaculture sector in India, Government has brought in various schemes such as PMMSY, FIDF and Kisan Credit Card. These schemes cumulatively aim at increasing fish production and the aquaculture exports from India, decrease the post-harvest losses. The PMMSY aims to achieve an annual production of 22 million metric tonnes by 2025 and increase the per capita consumption to 12 kg.

Furthermore, in the union budget of 2021, announcement for the development of 5 fishing harbors in the regions of Kochi, Chennai, Visakhapatnam, Paradip, and Petuaghat was made. Under this, Rs. 60 billion will be spent in order to develop the infrastructure facilities at these ports. As per PIB, Preparation of DPRs and Impact Assessment Study wherever required will be completed by 30th Sept, 2021 followed by sanction of the Projects by 31st December, 2021.

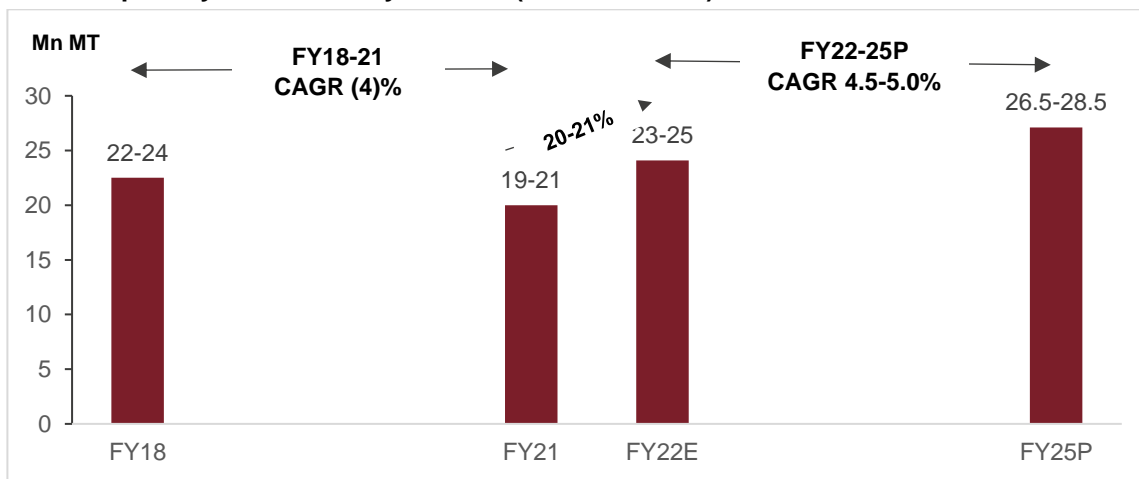
4.3 Poultry feed industry in India

Indian poultry feed market estimated at around Rs 510 billion in fiscal 2018

The poultry feed industry declined at ~4% CAGR, in volume terms, during fiscals 2018 to 2021. However, due to increase in feed price, the industry has grown, in value terms, at a CAGR of ~0.3% during the aforementioned period. Going forward, the poultry feed sector is expected to clock 3.5-4.0% CAGR in the over fiscals 2022 to 2025 to reach Rs 1,015-1,025 billion by fiscal 2025 aided by volume growth of 4.5-5.0% growth during the same period.

Overall outlook for the poultry feed industry is positive due to increase in demand for poultry products, driven by factors such as rise in income levels and shift in food styles.

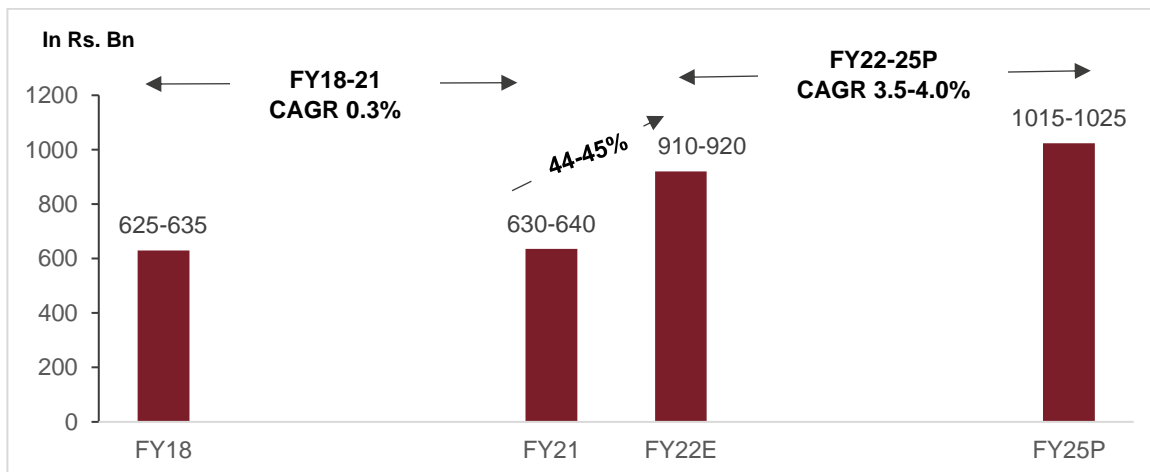
Trend of poultry feed industry in India (volume terms)



Note: E: Estimate, P: Projected

Source: CRISIL Research

Trend of poultry feed requirement (value)



Note: E: Estimate, P: Projected

Source: CRISIL Research

Key growth drivers

The Indian poultry feed industry, which is dependent on the sound growth of poultry, has grown considerably over the years, with South India holding the maximum share of poultry production and consumption.

Some of the key driving factors for poultry feed industry are:

Growth in poultry sector: The Indian poultry market is dominated by fresh poultry meat and eggs. Poultry consumption in India is on the rise, with higher incomes and greater international food exposure.

Rising disposable income has been a major demand driver for the industry, both domestically as well as internationally. Growth in per capita income and urban population in India has been accompanied by a shift from vegetarian to non-vegetarian diet. Eggs are now accepted as a source of protein in an increasing number of vegetarian homes. Chicken meat is one of the major sources of protein and is considered to be healthier than other varieties of meat. Additionally, there is growing acceptance and demand for processed chicken products.

Also the per capita consumption of chicken is expected to rise with the growing number of quick service restaurants such as KFC, McDonalds and Subway in the country.

Benefits over non-compound feed: Balanced animal nutrition helps livestock farmers keep their animals healthy and get the best out of them in terms of animal product quality and safety. Good quality animal feed can improve productivity significantly. In case of broiler, use of high-protein feed has resulted in increasing weight to 2-2.5 kg, in comparison with 1.5-2 kg earlier using compound feed.

Technological shift in nutritional requirement: Increasing industrial livestock production and technological innovation in the meat processing industry are creating a demand for high-quality meat, thereby driving the market for poultry feed.

Disease management though high nutrient diet: The spread of antimicrobial resistance is one of the greatest challenges to human health in modern history. Through improved animal nutrition strategies that maintain animal gut health and foster resistance to diseases, the feed industry can play a crucial role in prevention strategies of livestock farmers who seek to reduce the need for medication at the farm level.

Key risk factors

Price volatility of raw materials: Feed cost comprises the largest share of input cost in the poultry industry, having averaged 75-80% of total raw material cost over the past few years. The two major components of poultry feed are maize and soya. The industry uses varying proportions (40-80%) of maize in feed. Soya forms 20-30% share, while the remaining 10-30% is made up of de-oiled cakes, fishmeal, bran, nutrient mixes, etc. Any rise in prices of key feed ingredients impacts the use of other secondary feed materials to control operating costs.

Both supply- and demand-side drivers have influenced price fluctuations in the past. On the supply side, weather-related events, including droughts, have affected agricultural production in India, while on the demand side, our growing population has increased the demand for grains, both as a commodity for direct human consumption and as feed input in the production of animal protein.

Occupational shift: The shift from individual farming to contract farming is a major threat for specialist feed producers as the integrators generally have captive R&D and feed manufacturing units. Growing acceptance and therefore demand for processed chicken, and cost benefits of vertical integration and large-scale operations have expanded the market share of integrated players.

Poor disease management: As per a WHO report, there have been 29 instances of bird flu reported in India between 2006 and 2012. Since 2006, India has culled more than 6 million birds due to bird flu. Avian flu alert was reported in Karnataka in May 2016, in which 23,000 birds perished, and the authorities ordered culling of about 1.50 lakh birds on farms, in order to prevent spread of the infection to other areas. Recurring bird flu cases are on account of poor disease management. This sporadic bird flu outbreak is expected to impact demand.

In 2007, India banned poultry and poultry product imports from the USA in order to prevent the spread of low pathogenic avian influenza. However, in June 2015, the World Trade Organization's (WTO) Dispute Settlement Body ruled in favour of the US, forcing India to allow imports of chicken legs from January 2017. Poultry organisations would examine other science-based reasons, including genetically modified feed and effects of long-term poultry cold storage, to see if other restrictions could be imposed.

Key government regulations impacting the animal feed industry in India

Government regulations impacting the poultry sector have a direct impact on the poultry feed industry as well.

Key government policies related to poultry industry

Scheme/parameter	Details
Before 1991	
All India Poultry development Programme	Increasing availability of chicks and supply inputs and making cold storage facilities available
Recognition of poultry farming as an activity for poverty alleviation	Small and medium farmers were provided with credit facilities, subsidy and technical assistance to adopt poultry farming as a supplementary source of income
Poultry estates	Establishment of poultry estates in collaboration with government agencies such as National Cooperative Development Corporation (NCDC), National Bank for Agriculture and Rural Development (NABARD), state governments and NGOs
Funding research initiatives	Setting up various regional poultry farms, introducing Intensive Poultry Development Projects, setting up Central Training Institute for Poultry Production and Management
Self-sufficiency in DOCs	Imports of all poultry products were banned or restricted through tariff and quantitative restrictions. This led to genetic developments and self-sufficiency through VH Groups BV-300 for the layer market and Vencobb for the broiler one
Post 1991	
Raise in tariffs	Under the economic liberalisation policy, tariff rates on poultry products were raised from 15% to eventually 30% in FY05
Maize Development Mission	Intensifying R&D to increase yields, oil content, etc., to cope with increasing demand
Assistance to state poultry farms	100% assistance in northeastern states, and 80% in other states. The limit of assistance provided is 85 lakhs for each farm
Rural Backyard Poultry Development Programme	To enable the below poverty line (BPL) section of society to earn supplementary income and obtain nutritional support
Priority lending status for banks	The sector has this status since 1999
Technology upgradation	40% subsidy in general areas and 50% subsidy in difficult areas for machinery in various segments, subject to a maximum of Rs 1 crore of total costs
Poultry venture capital fund	Provides financing for technology upgradation, establishment of feed godowns, feed mills, breeding farms, etc.
Food parks	Provides financial assistance up to 75% of project cost, subject to a ceiling of Rs 50 crore

Scheme/parameter	Details
Assistance to States for Control of Animal Diseases (ASCAD)	It is joint scheme by states and central government to control the economically important diseases occurring in poultry such as Ranikhet Disease, Infectious Bursal Disease, Fowl Pox etc., including control and containment of emergent and exotic diseases like Avian Influenza
National Livestock Mission	Under this scheme financial support is provided for implementation of Rural Backyard Poultry Development (RBPD) and Innovative Poultry Productivity Project (IPPP) in states and Union territories. These programs majorly focus to take care of shelter, feed, medicine, Equipments, Litter etc for the improvement of the living conditions for Poultry birds

Source: CRISIL Research

Regulatory body

In India, the Bureau of Indian Standards (BIS), a central government organisation, is responsible for the standardisation, marking and quality certification of goods. While the BIS has issued guidelines for feed standards, the industry also has its own guidelines, and there is currently no compulsion to use BIS standards. Similarly, while BIS and compound livestock feed manufacturers association of India (CLFMA) have issued standards for manufacture of poultry feed, there is no statutory compulsion of following the same.

4.4 Cattle feed industry in India

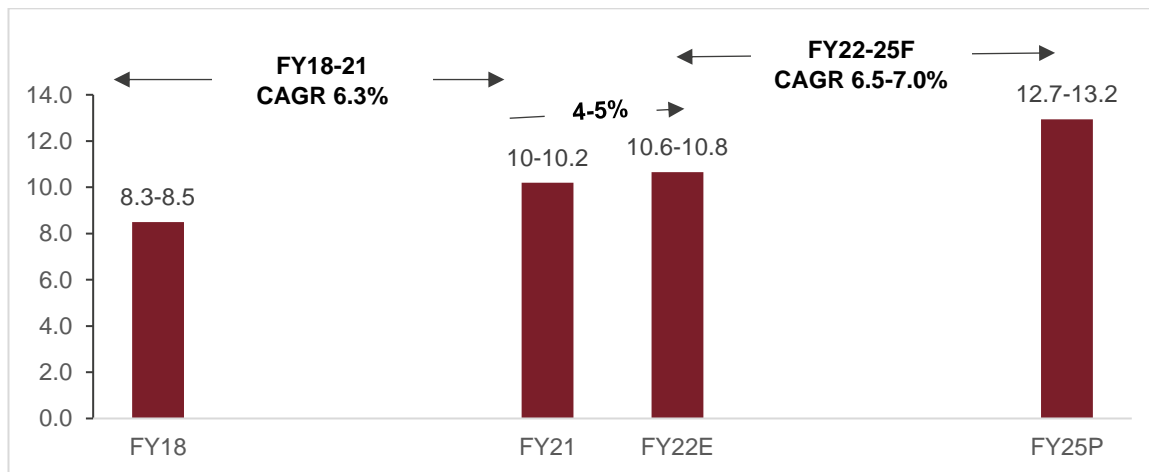
Cattle feed industry in India generates Rs 190-200 billion in revenue

A large population of dairy animals is either grazed or stall-fed on dry roughage of uncertain quality. Availability of sufficient feed resources both in quantitative and qualitative terms is the key factor for growth and sustenance of the livestock sector in India. Cattle owners' are being educated regarding the significance of quality cattle feed by government organisations like National Dairy Development Board (NDDB) and also by some private players, and this has led to a gradual rise in demand for compound feed.

The market size of compound cattle feed manufactured by organised players is estimated at 10-10.2 million tonne in fiscal 2021. In volume terms, the market clocked 6-6.5% CAGR between fiscals 2018 and 2021. In value terms, it clocked 9.0-9.5% CAGR and was estimated to be Rs 195-200 billion. Growth was basically driven by the demand for dairy products and value-added dairy products.

Going ahead, CRISIL Research believes that cattle feed manufacturing by organised players shall increase at the same rate, in both value as well as volume terms. CRISIL Research expects feed manufacturing volume to reach 12.7-13.2 million tonne by fiscal 2025, at 6.5-7% CAGR. During the period, feed manufacturing in value terms shall grow to Rs 290-300 billion at 7-7.5% CAGR. Growth can basically be attributed to factors such as increasing awareness among farmers to use compound feed, increasing consumption of milk and milk products due to increased income levels, changing lifestyles and increasing health awareness.

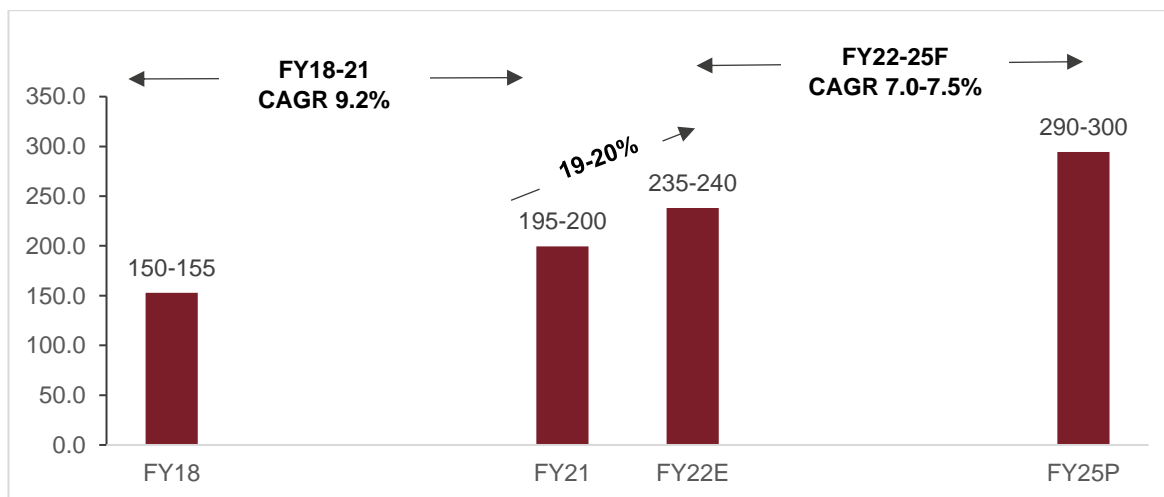
Trend of cattle feed industry in India (volume terms)



Note: E: Estimated; P: Projected

Source: CRISIL Research

Trend of cattle feed industry in India (value terms)



Note: E: Estimated; P: Projected

Source: CRISIL Research

Key growth drivers for the cattle feed industry in India

Increasing milk production and rising per capita consumption of milk

Domestic milk production logged ~6% CAGR to reach 187.7 million tonne in fiscal 2019 from 132.4 million tonne in fiscal 2013. The domestic dairy industry consists a mix of cooperatives and private players. Small and marginal farmers have benefited from government initiatives such as the National Dairy Plans 1 & 2 and Operation Flood in the past. Attractive prices offered by cooperatives encouraged dairy farmers to shift from indigenous cows towards high-yielding cross-bred varieties, contributing to a rise in milk supply and farmer incomes. Setting up support infrastructure such as cattle feed plants by cooperatives, training programmes, and government initiatives led to further increase in milk production. Per capita consumption of milk rose at ~5% CAGR between fiscals 2013 and 2019.

Key factors driving milk consumption growth in India are:

Favourable demographic trends: Rising trends in urbanisation, migration across the country, number of working women, disposable incomes, etc., have led to an increase in consumer demand and access to packaged dairy products.

Increasing demand for fast food: Value-added products (VAPs) such as cheese and paneer, which find usage in pizzas, pastas, burgers etc., have been witnessing growing demand.

Changing lifestyle and increasing health awareness: Preference for low-fat, high-protein diet among youth is driving demand for low-fat milk, yoghurt/cheese, and protein-based health drinks.

Shift towards branded products: Most players are focusing on strong brand recall and marketing activities with focus on VAPs.

Rise in number of retail players: Retail players such as BigBasket, Reliance Fresh and Amazon, offering a range of dairy products online and modern retail format growth have catalysed the growth of VAPs.

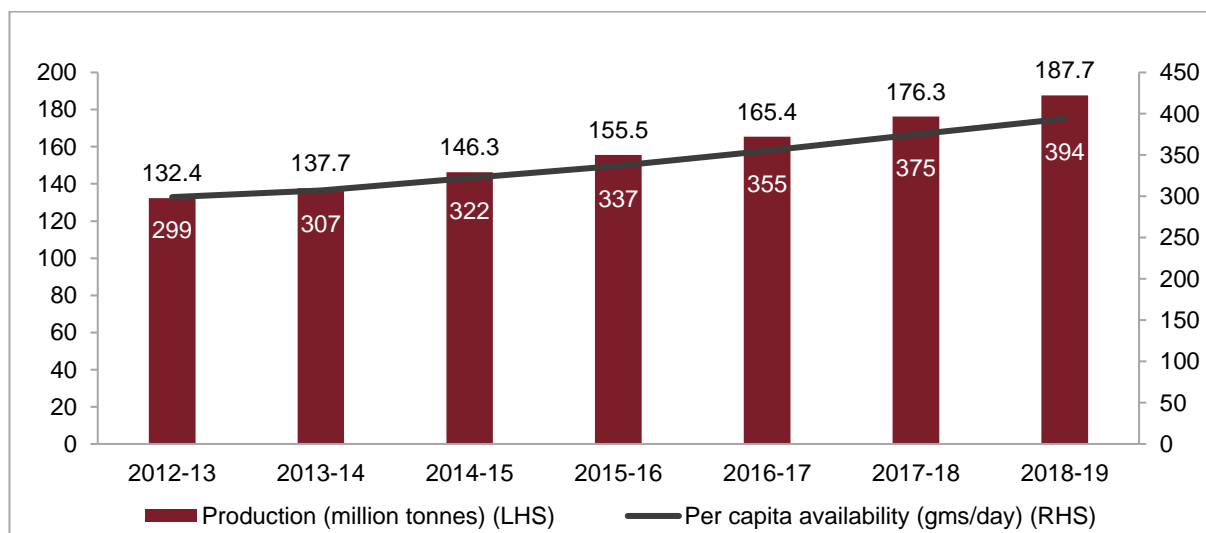
Rising share of high-margin milk products: With high-margin milk products accounting for nearly 40% of the total milk procured in India, greater value-addition by companies - driven by the rise in urbanisation and change in consumer lives - would drive up player-wise growth rates.

Government incentives via priority lending status and National Dairy Plan: Priority lending status to the dairy industry and improving supply through the National Dairy Plan are incentives provided by the government will attract investments from more companies, thus enabling the sector to grow at a strong pace.

Innovation, better quality across price points: Companies are increasingly innovating and manufacturing products across all price points to cater to consumers with varying tastes and preferences. This, coupled with enhanced packaging, longer shelf life and better quality of products, will drive further penetration of processed milk products, and thereby support long-term growth.

Improvement in supply chain infrastructure: With cold storage facilities, transportation, and other critical supply chain infrastructure improving across India, companies will be able to manufacture and sell more products over the medium term. This would help increase penetration of processed milk products in towns and villages, thus driving growth of the dairy and milk products industry over the next 3-4 years.

Domestic milk production, consumption and per capita consumption trend



Note: Latest data available is as of 2018-19

Source: NDDB, CRISIL Research

Government initiatives for the dairy sector include:

- Priority sector lending status for the dairy sector since 1999
- 100% foreign direct investment permitted in the sector
- **National Programme for Dairy Development (NPDD):** This program envisages the creation or strengthening of infrastructure required for quality milk production as well as procurement, Processing and Marketing of Milk & Milk Products
- **Rashtriya Gokul Mission:** This mission mainly focuses on development and conservation of indigenous bovine breeds as well as upgradation of bovine population. It envisages to improve farmers revenue by enhancing milk production and productivity of bovines
- **National Animal Disease Control Programme (NADCP):** This program is created to control of Foot and Mouth Disease and Brucellosis among dairy animals
- **Animal Disease Control Programme:** It is aimed at controlling economically important livestock diseases and focuses on establishing mobile veterinary clinics to deliver veterinary services at farmer's doorstep.
- **Dairy Processing Infrastructure Development Fund (DIDF):** This fund was announced under Union Budget 2017-18 to strengthen the milk processing, value addition and chilling facilities in dairy industry by fiscal 2023 with an outlay of Rs. 111.8 billion. Under this fund, loans are provided by National Bank for Agriculture and Rural Development (NABARD)/ National Dairy Development Board (NDDB)/ National Cooperative Development Corporation (NCDC) to Dairy Co-operative, Multi State Dairy Cooperative, Milk Producer Companies (MPC) among others with interest subvention at 2.5%
- **Animal Husbandry and Infrastructure Development Fund (AHIDF):** Launched in 2020 with a capital outlay of Rs. 150 billion this fund offers capital required for entrepreneurs, private companies, MSMEs, Farmer producer organisations (FPO) to start or expand existing units under dairy and meat processing and animal feed plants.

Depletion of pastures stimulates the compound cattle feed industry

Rapid depletion of green pastures across India, as a fallout of urbanisation and frequent droughts owing to inadequate monsoons, coupled with the booming dairy industry, has boosted demand for the cattle feed industry. The falling area under grazing stimulates the compound cattle feed industry directly, as depletion of green pastures forces dairy farmers to use compounded cattle feed.

Increasing awareness of advantages of compound cattle feed

Private players and NDDB are continuously training and educating farmers on the importance of using compound feed for cattle. According to NDDB, compound cattle feed is palatable and good source of nutrients for growing, milk producing and pregnant animals. Through regular use of compound cattle feed in prescribed quantity along with basal diet, cost of milk production from dairy animals can be optimised, and net profitability for farmers can be increased. Private players engage teams, which travel across villages and understand the issues faced by dairy farmers. They organise training sessions for farmers to improve their understanding of cattle health, feed, etc. All this has led to greater awareness and a gradual shift from traditional to compound feed among farmers.

Procurement and stocking of raw materials

Major soya producing states are Maharashtra, Madhya Pradesh, Rajasthan, Andhra Pradesh, Karnataka, Chhattisgarh, and Gujarat. Maize is mainly produced in Karnataka, Andhra Pradesh, Tamil Nadu, Rajasthan, Maharashtra, Bihar, Uttar Pradesh, Madhya Pradesh, and Gujarat. Sugarcane is cultivated mainly in Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Uttar Pradesh, and Tamil Nadu. Molasses, a by-product of sugarcane, is used as a raw material for compound cattle feed.

The availability of raw materials used for cattle feed can be seasonal. Taking this into consideration, cattle feed producers stock raw materials well in advance from the nearest point of their plant site. Most raw materials such as rice bran, wheat bran, and soya, have a shelf life of 4-6 months.

Challenges for the compound cattle feed industry

Disease outbreak

As cattle feed industry is directly related to the cattle segment, any type of disease outbreak among cattle would reduce the consumption of feed. Major cattle disease include rabies, clostridial disease or blackleg, bovine respiratory disease complex, etc.

Inability to pass on increase in manufacturing expenses

Manufacturers find it difficult to pass on the burden of any upward movement in prices of raw materials used for compound cattle feed, as there is stiff competition from cooperative dairy societies. Farmers may also opt not to buy compound feed for some time if the price is high.

Prices of maize and soya tend to rise during crop failure, and owing to delayed and deficient monsoon. Hence, players generally stock raw materials whenever prices are down. In this way, players try to mitigate the risk of price volatility. However, in case of sudden rises in prices, players cannot pass on the increase onto dairy farmers

Raw materials, being the major component of cost, play a crucial role in determining profitability. Thus, fluctuation in prices would affect operating margin of feed manufacturers.

Beef ban

The Prevention of Cruelty to Animals (Regulation of Livestock Market) Rules, notified in May 2017, require that cattle traders pledge that any cows or buffalos sold are not intended for slaughter. Traditionally, cattle fairs and markets allowed the sale of animals headed to abattoirs to provide raw materials used in dozens of industries, including leather making, soap and fertilisers. Cattle earlier were raised for the sole purpose of slaughtering and exports. Banning beef may therefore lead to less or no consumption of cattle feed, which may affect the animal feed industry.

Subsidised cattle feed provided by dairy cooperative societies

Private players, especially small players, find it difficult to compete with dairy cooperative societies, which provide subsidised compound feed to dairy farmers. This poses a great challenge for small players, who find it difficult to sustain.

Unwillingness of farmers to use compounded feed

The cattle population is fragmented and spread over large parts of the country. Although attempts are being made to spread awareness, low levels of education among farmers and strong traditional beliefs mean use of compound cattle feed still remains low. Also, industrially manufactured compound cattle feed has proved its value for cross-bred cows and buffaloes, but not for low-yielding cattle because of their genetic limitations.

Prevalent traditional cattle feed manufacturing processes

Traditionally, when it comes to cattle feed, farmers have been choosing their own ingredients and preparing their own formulations. Apart from being cost effective, such customised feed also leads farmers to believe that it provides better nutrition to their animals. Productivity of indigenous cattle is often limited because of their poor genetic make-up. Therefore, usage of high-quality compound feed (industry feed) does not generate a significant improvement in productivity. This hampers the growth of the cattle feed industry, as most farmers are reluctant to

use compound feed fully. Instead, they compromise by using such feed in proportions of 50-60%, making up the balance with their own formulations.

Role of R&D

Compound feed is given to cattle to increase milk production. Hence, continuous R&D is required to increase the nutritive value of the end product, and reduce the total cost involved in the manufacturing process. However, typically, only big players invest in R&D.

5 Competitive assessment of key players

Operating parameters

Brief Information about key players in the industry

Company name	Established in	Registered as company in	Production capacity (in Metric tonnes per day)	Plant locations	Corporate office
Mukka Proteins limited	2003	2010	167	Mangalore and Gujarat	Mangalore, Karnataka
Janatha Fish meal and oil products	1989	-	180	Udupi, Karnataka	Udupi, Karnataka
TJ Marine Products Pvt. Ltd	2004	2014	240	MIDC Ratnagiri - Maharashtra	Udupi, Karnataka
Arbee Aquatic Proteins Pvt Ltd	1978	2005	82	Allepey, Kerala	Kottayam, Kerala
Akash Fishmeal and Fish oil Pvt. Ltd	-	2015	160	Vengurla, Maharashtra	Sindhudurg, Maharashtra
Omega Fishmeal and oil Pvt. Ltd	2011	2011	200	Ratnagiri Maharashtra	MIDC Ratnagiri & Mumbai, Maharashtra

Note:

- Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players
- Other than above mentioned, plant locations of subsidiaries for Mukka Proteins Limited are located at Ullal, Gujarat and Oman
- Production capacities for all players, is sourced from Marine products export development authority (MPEDA) and reflects the export approved standalone capacities.
- Capacity mentioned above is the output capacity for the respective players
- The promoters of Janatha Fish meal and oil products are also involved in the business of TJ marine products pvt ltd
- The father of Mr. K Mohammed Haris has presence in fish meal and fish oil industry through "Haris Marine private limited" since 1975. "Haris Marine private limited" which a subsidiary of Mukka proteins limited, has revenue from operations of Rs. 530 million during fiscal 2021.

Source: MPEDA, CRISIL Research

Product offerings of key players

Company name	Fishmeal	Fish oil	Fish soluble	Refined / value added Fish oil	Other
Mukka Proteins limited	✓	✓	✓	✓	-
Janatha Fish meal and oil products	✓	✓	✓	✓	✓
TJ Marine Products Pvt. Ltd	✓	✓	✓	-	-
Arbee Aquatic Proteins Pvt Ltd	✓	✓	✓	✓	✓
Akash Fishmeal and Fish oil Pvt. Ltd	✓	✓	-	-	-
Omega Fishmeal and oil Pvt. Ltd	✓	✓	✓	-	✓

Note: Others include product offerings unrelated to fishmeal and fish oil processing

Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players

Source: CRISIL Research

Exports for fish meal and fish oil

Financial year	FY17	FY18	FY19	FY20	FY21
Fish meal exports ('000 kgs)					
Mukka Proteins	21,320	21,460	28,412	37,536	34,320
Total India exports	54,356	69,875	90,296	67,180	70,089
Share in (%)	39%	31%	31%	56%	49%
Fish Oil exports ('000 kgs)					
Mukka Proteins	2,848	2,823	1,038	962	113
Total India exports	14,734	24,252	5,107	1,846	116
Share in (%)	19%	12%	20%	52%	98%

Source: Company interactions, DGCIS, CRISIL Research

Market share (FY21)

Company name	Total Operating Revenue (Rs. billion)	Market share (%)	Total Indian Fishmeal and fish oil industry (Rs. billion)
Mukka Proteins limited	5.4	30% - 35%	16 - 18

Note: Market share is based on standalone financials

Source: CRISIL Research

Capacity share for fish meal and fish oil

Overall capacity (MT per day)	Mukka Proteins Limited (MT per day)	Share (%)
4,102	150	3-4%

- Note: Overall capacity is as per MPERDA Newsletter, January 2020
- Capacity for mukka proteins limited is as of February 2021
- The above mentioned capacity for mukka proteins limited include fish meal and fish oil

Financial parameters

Key Financials for fiscal 2021

Company name	Standalone / Consolidated	Operating Revenue	CAGR (FY18-21)	Operating profit	Operating profit margin	Net profit	CAGR (FY18-21)	Net profit margin
		Rs. Million	%	Rs. Million	%	Rs. Million	%	%
Mukka Proteins limited	Standalone	5,362	26	102	1.9	46	(11)	0.9
Janatha Fish meal and oil products	Standalone	2,767	8	NA	NA	27	6	1.0
TJ Marine Products Pvt. Ltd	Standalone	1421	5	71	5.0	14	(17)	1.0
Arbee Aquatic Proteins Pvt Ltd	Standalone	467	5	57	12.3	17	(14)	3.7

Company name	Standalone / Consolidated	Operating Revenue	CAGR (FY18-21)	Operating profit	Operating profit margin	Net profit	CAGR (FY18-21)	Net profit margin
Akash Fishmeal and Fish oil Pvt. Ltd	Standalone	393	(15)	2	0.4	(35)	NM	(8.9)
Omega Fishmeal and oil Pvt. Ltd #	Standalone	71	(71)	(127)	NM	(203)	NM	NM

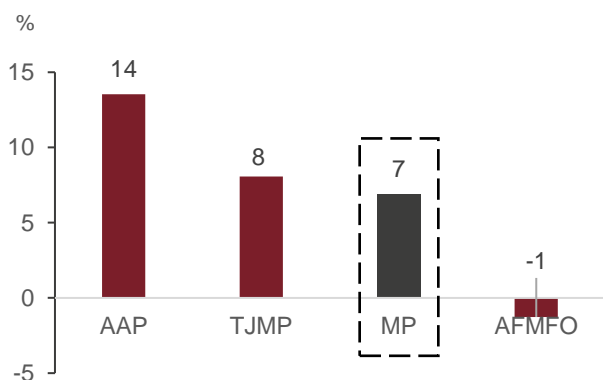
Note:

- Table contents have been sorted based on operating revenue in descending order, beginning with the highest operating revenue among the set of players
- Janatha fish meal and oil products is a partnership firm, the above mentioned values are taken from the credit rating rationale for company.
- #: Values for omage fish meal and oil pvt ltd are as of fiscal 2020 and CAGR is from fiscal 2018-20
- NM: Not Meaningful due to negative values, NA: Not Available

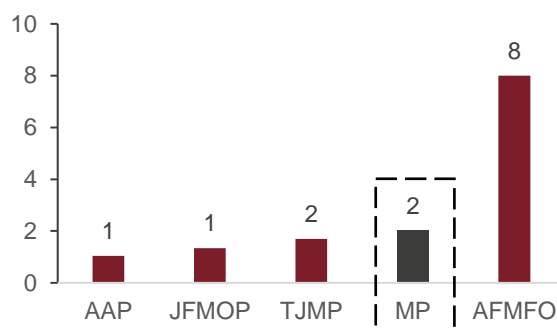
Source: Company annual reports, CRISIL Research

Other key financial ratio for fiscal 2021

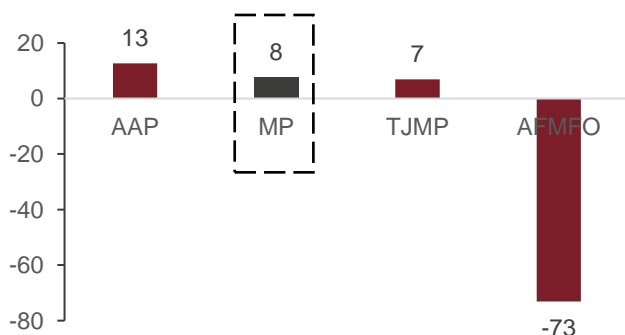
ROCE (%)



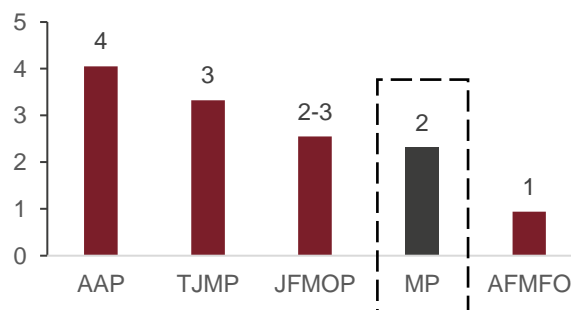
Gearing (times)



ROE (%)



Interest coverage (times)



Note:

- MP: Mukka Proteins. Ltd, AFMFO: Akash Fishmeal and Fish oil Pvt. Ltd, AAP: Arbee Aquatic Proteins Pvt Ltd, JFMOP: Janatha Fish meal and oil products, OFMO: Omega Fishmeal and oil Pvt. Ltd, TJMP: TJ Marine Products Pvt. Ltd
- Janatha fish meal and oil products is a partnership firm, the above mentioned values are taken from the credit rating rationale for company.
- ROCE and ROE ratio's for Janatha fish meal and oil products are not available
- For Omega Fishmeal and oil Pvt. Ltd latest available is as of fiscal 2020, hence not mentioned above

Source: Company annual reports, CRISIL Research

Key observations

- Mukka proteins limited through its promoters has presence in the fish meal and fish oil industry since 1975. Among the other players listed above, Arbee Aquatic Proteins Pvt Ltd has presence in the fishmeal and fish oil industry since 1978.
- Over the past 5 years, fiscal 2017 to 2021, share of Mukka Proteins limited in fish meal exports from India has ranged from 30-60% in volume terms
- Between fiscal 2017 to 2020, share of Mukka Proteins limited in fish oil exports from India has ranged from 20-50% in volume terms
- As per CRISIL Research, Mukka proteins limited with total operating revenue of Rs 5.4 billion, has a market share of 30-35% in the fish meal and fish oil industry for fiscal 2021 which is estimated to be Rs. 16-18 billion for the corresponding period.
- In terms of operating revenues, Mukka Proteins limited is the largest player with revenue of Rs. 5,362 million for fiscal 2021. Janatha fish meal and oil products is the second largest player with revenue of Rs. 2,767 million for fiscal 2021.
- Operating revenue for Mukka Proteins limited has grown at a faster pace when compared to its peers mentioned above at a CAGR of 26% from fiscal 2018 to 2021.
- Net profit for Mukka Proteins limited has degrown at CAGR of ~11% from fiscal 2018 to 2021. During the same period Janatha fish meal and oil products stands first with a growth of 6% among the players mentioned
- In terms of profitability, Arbee Aquatic Products Pvt Ltd. ranks higher among the players listed above, with net profit margin of ~4% for fiscal 2021. It is followed by TJ Marine Products Pvt. Ltd, Janatha fish meal and oil products and Mukka Proteins limited.
- As per CRISIL Research estimates and MPEDA database, Mukka Proteins Limited occupies a share of ~4% in the overall fish meal and fish oil capacity in India. The lower share in capacity can be attributed to non-operation of few units and limited utilization rates of plants in fish meal and fish oil industry, as CRISIL Research has considered capacities registered with MPEDA for fish meal and fish oil industry.
- It is vital to note that, availability of raw materials i.e, fish species required to produce fish meal and fish oil acts as the major constraints in this industry rather the production capacities available.

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