Performance Review of Commodity

MAIZE - FEED / INDUSTRIAL GRADE

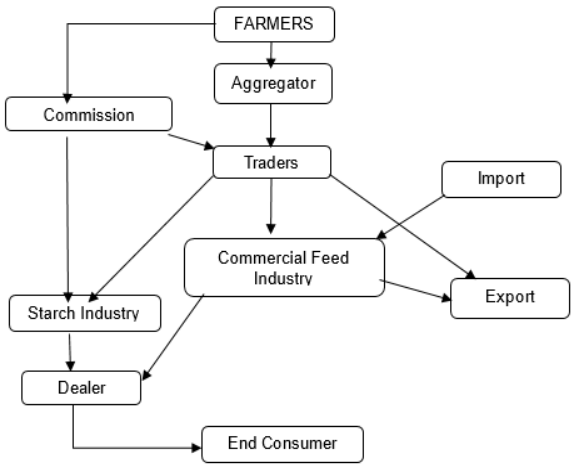
1. Background

a. Brief about the commodity such as sample picture, lifecycle and various varieties/grade of the commodity found in India

Maize (Zea mays) belongs to the grains family Graminae and is known as Queen of Cereals due to its diverse uses. It is also called as Corn. It occupies an important place in world agriculture, being cultivated in more than 150 countries, including USA, China, Brazil, Ukraine, Argentina and India. In India, Maize is the third most important crop after rice and wheat. Maize has diversified uses and widely used as human food, poultry feed, animal feed, industrial (starch) products, beverages and seed. Maize requires moderate climate for growth, excess or deficient rains adversely affect yields as well quality. It grows well in loamy soils. Maize in India is grown in both Kharif and Rabi seasons. Proportionate share of Kharif and Rabi season maize in total maize production remains around 70% and 30%, respectively. In kharif, it is sown in June-July till mid-August and harvested from mid-September. The important states are Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh and Uttar Pradesh. In Rabi, maize is grown mainly in Bihar, West Bengal, parts of Uttar Pradesh and coastal region of Andhra Pradesh. The arrivals start from late March and extend up to June-July.

Crop Cycle (India)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maize Kharif												
Maize Rabi												
	Sowing			Harvesting								

Life Cycle:
Value Chain of the Commodity



Major Varieties of Maize and NCDEX Quality Specifications

Major Varieties

KNMH-4010141, DMRH1301, CoH (M) 10, CoH (M)8, DHM 121 (BH 41009), Pant Shankar Makka-1, DHM 119 (BH 4062), Maize Hybrid AH-58 (PEHM3)

NCDEX : Quality Parameters

Count	Up to 400 grains per 100 grams
Moisture	14% max
Fungus	1% Max
Damaged seeds	6% max. Out of this weeviled grains will be 0.5% max.
Foreign Matter	2% max
Maize shall be free from any colouring agent, moulds, live pests and obnoxious smell	

b. Commodity fundamentals and balance sheet as per the following format (to be prepared based on publicly available information on best effort basis):

Table - Fundamentals & Balance sheet (quantity)

(In Lakh Tonnes)

Global Scenario	Previous FY (2018-19)	Current FY (2019-20) (P)
Opening Stocks	3,415.95	3,209.40
Production	11,236.48	11,130.22
Imports	1,629.30	1,690.28
Total Supply	16,281.73	16,029.90
Exports	1,808.90	1,659.29
Domestic Consumption	11,263.43	11,338.90
Ending Stocks	3,209.40	3,031.71

Source: USDA (April 2020); P= Provisional

(In Lakh Tonnes)

Indian Scenario	Previous FY (2018-19)	Current FY (2019-20) (P)
Opening Stocks	23.29	13.46
Production	277.15	285.00
Imports	2.21	4.00
Total Supply	302.65	302.46
Exports	4.19	5.00
Domestic Consumption	285.00	284.00
Ending Stocks	13.46	13.46

Source: USDA (April 2020); P= Provisional

(In Lakh Tonnes)

Rank	Top 10 Major Producing Countries			Top 10 Major Consuming Countries		
	Country	Previous FY	Current FY	Country	Previous FY	Current FY
1	United States	3,642.62	3477.82	United States	3,104.72	3,083.71
2	China	2,573.30	2,607.70	China	2,740.00	2,790.00
3	Brazil	1,010.00	1,010.00	European Union	880.00	835.00
4	European Union	643.62	666.31	Brazil	670.00	670.00
5	Argentina	510.00	500.00	Mexico	441.00	445.00
6	Ukraine	358.05	358.87	India	285.00	284.00
7	India	277.15	285.00	Egypt	162.00	167.00
8	Mexico	276.00	250.00	Japan	160.00	161.00
9	South Africa	118.24	160.00	Argentina	138.00	150.00
10	Russia	114.15	142.75	Vietnam	142.00	148.50
	Others	1,713.35	1,671.77	Others	2,540.71	2,604.69
	World Total	11,236.48	11,130.22	World Total	11,263.43	11,338.90

Source: USDA (April 2020), Previous FY is 2018-19 and Current FY 2019-20
Countries are arranged in descending order based on the figure in Current FY

(In Lakh Tonnes)

Rank	Top 10 Major Exporting Countries			Top 10 Major Importing Countries		
	Country	Previous FY	Current FY	Country	Previous FY	Current FY
1	United States	524.57	438.17	European Union	252.09	210.00
2	Brazil	397.49	360.00	Mexico	166.58	173.00
3	Argentina	372.44	335.00	Japan	160.47	160.00
4	Ukraine	303.21	320.00	Korea, South	108.56	114.00
5	Russia	27.70	42.00	Vietnam	102.00	111.00
6	European Union	36.29	36.00	Iran	90.00	100.00
7	South Africa	12.00	25.00	Egypt	93.67	99.00

Rank	Top 10 Major Exporting Countries			Top 10 Major Importing Countries		
	Country	Previous FY	Current FY	Country	Previous FY	Current FY
8	Serbia	28.36	22.00	China	44.83	70.00
9	Paraguay	29.00	20.00	Colombia	60.48	62.00
10	Burma	15.00	13.00	Algeria	45.21	47.00
	Others	62.84	48.12	Others	505.41	544.28
	World Total	1,808.90	1,659.29	World Total	1,629.30	1,690.28

Source: USDA (April 2020), Previous FY is 2018-19 and Current FY 2019-20
Countries are arranged in descending order based on the figure in Current FY

(In Lakh Tonnes)

Top 10 Major Producing States in India			
Rank	States	Previous FY*	Current FY*
1	Karnataka	33.14	38.54
2	Madhya Pradesh	33.41	35.37
3	Maharashtra	34.53	30.51
4	Tamil Nadu	9.53	25.92
5	Telangana	26.63	25.56
6	Bihar	26.90	23.55
7	Andhra Pradesh	16.53	23.22
8	Rajasthan	13.79	17.94
9	Uttar Pradesh	15.25	15.98
10	West Bengal	7.05	11.35
	Others	42.23	39.58
	Grand Total	259.00	287.53

Source: Ministry of Agriculture, *Latest available data for state wise production is available only till 2017-18. Thus, in the above Table Previous FY corresponds to 2016-17 and Current FY corresponds to 2017-18; States are arranged in descending order based on the figure in Current FY

c. Major changes in the polices governing trade in the spot markets of the commodity (FY 2019-20)

Date	Major Policies governing trade and Changes
3-Apr-19	Govt. allowed import of one lakh tonne feed-grade Maize at 15% duty under the tariff rate quota in order to ease supply shortage in the country on actual user condition. Maize attracts 60% import duty, but under the tariff rate quota, imports are allowed duty-free for a specified quantity.
3-Jul-19	MSP increased by 3.5% to Rs 1760 per qtl for Marketing year 2019-20 from Rs 1700 per qtl. in the previous year.
9-Jul-19	Govt. allowed import of another 4 Lakh Tonnes of feed-grade maize under the tariff rate quota at 15% import duty for 2019-20 (Apr-Mar)
27-Mar-20	The Govt. exempted mandis, procurement agencies, farm operations, agri machinery hiring centres as well as intra- and inter-state movement of farm implements from the lockdown rules.

d. Geo political issues in the commodity and its impact on Indian scenario (FY 2019-20)

Date	Event	Key Details	Key Implications/Impact
20-Jan-20	China declared an emergency about corona virus attack.	Outbreak of novel coronavirus (2019-nCoV) that was first reported from Wuhan, China, on 31 December 2019.	Expectation of decline in international trade leading to weakening of the market sentiments.
11-Mar-20	COVID-19	WHO declared COVID 19 as a pandemic	Economic Slow Down

19-Mar-20 and thereafter	Lockdown in Indian States	Indian PM urged countrymen to observe Janta Curfew on 22nd March. It is followed by nation-wide lock-down for 21 days effective from Mar 25.	Physical Market activities started getting adversely impacted due to movement restrictions and closures of physical markets.

2. Trading Parameters

a. Monthly and Annual traded volume (quantity in appropriate units)

Monthly Traded Volume		
Month	Contract	Traded volume (MT)
Apr-19	MAIZERABI	8,270
May-19	MAIZERABI	16,330
Jun-19	MAIZERABI	21,250
Jul-19	MAIZERABI	8,090
Aug-19	MAIZEKHRIF	50
Aug-19	MAIZERABI	6,730
Sep-19	MAIZEKHRIF	400
Sep-19	MAIZERABI	3,560
Oct-19	MAIZEKHRIF	690
Oct-19	MAIZERABI	670
Nov-19	MAIZEKHRIF	620
Dec-19	MAIZEKHRIF	280
Feb-20	MAIZE	820
Mar-20	MAIZE	880
Yearly Traded Volume		
MAIZE		1,700
MAIZEKHRIF		2,040
MAIZERABI		64,900

b. Annual traded volume as proportion of total deliverable supply (quantity in appropriate units)

Symbol	Traded volume (MT)	Deliverable supply(MT)	Proportion
MAIZE	1,700	28,320,000	0.24%
MAIZEKHRIF	2,040		
MAIZERABI	64,900		

c. Annual traded volume as proportion of total annual production (quantity in appropriate units)

Symbol	Traded volume (MT)	Production(MT)	Proportion
MAIZE	1,700	27,820,000	0.25%
MAIZEKHRIF	2,040		
MAIZERABI	64,900		

d. Annual average Open interest as proportion of total production

Symbol	Avg Open Int(MT)	Production(MT)	Proportion
MAIZE	334	27,820,000	0.01%
MAIZEKHRIF	105		
MAIZERABI	3,195		

e. Annual average Open interest as proportion of total deliverable supply

Symbol	AvgOpen Int(MT)	Deliverable supply(MT)	Proportion
MAIZE	334	28,320,000	0.01%
MAIZEKHRIF	105		
MAIZERABI	3,195		

f. Monthly and Annual value of trade (in Rs. Crores)

Monthly Traded Value		
Month	Contract	Traded Value(in Cr.)
Apr-19	MAIZERABI	16
May-19	MAIZERABI	31
Jun-19	MAIZERABI	41
Jul-19	MAIZERABI	18
Aug-19	MAIZEKHRIF	0
Aug-19	MAIZERABI	15
Sep-19	MAIZEKHRIF	1
Sep-19	MAIZERABI	7
Oct-19	MAIZEKHRIF	1
Oct-19	MAIZERABI	1
Nov-19	MAIZEKHRIF	1
Dec-19	MAIZEKHRIF	1
Feb-20	MAIZE	1
Mar-20	MAIZE	1
Yearly Traded Volume		
MAIZE		3
MAIZEKHRIF		4
MAIZERABI		129

g. Monthly and Annual quantity of delivery (in appropriate units)

Monthly Delivery Quantity		
Month	Contract	Total Delivery (MT)
May-19	MAIZERABI	2,340
Jun-19	MAIZERABI	7,610
Jul-19	MAIZERABI	2,440
Aug-19	MAIZERABI	2,490
Sep-19	MAIZERABI	3,690
Oct-19	MAIZERABI	440
Nov-19	MAIZEKHRIF	420
Dec-19	MAIZEKHRIF	460
Yearly Delivery Quantity		
MAIZEKHRIF		880
MAIZERABI		19010

h. Monthly and Annual value of delivery (in Rs. Crores)

Monthly Delivery Value		
Month	Contract	Value in Cr
May-19	MAIZERABI	4

Jun-19	MAIZERABI	13
Jul-19	MAIZERABI	5
Aug-19	MAIZERABI	5
Sep-19	MAIZERABI	8
Oct-19	MAIZERABI	1
Nov-19	MAIZEKHRIF	1
Dec-19	MAIZEKHRIF	1
Yearly Delivery Value		
MAIZEKHRIF		2
MAIZERABI		37

i. Monthly and Annual Average Open Interest (OI) (in appropriate units)

Monthly Average OI		
Month	Contract	Avg Open Int (MT)
Apr-19	MAIZERABI	5,355
May-19	MAIZERABI	7,759
Jun-19	MAIZERABI	4,695
Jul-19	MAIZERABI	4,380
Aug-19	MAIZEKHRIF	50
Aug-19	MAIZERABI	2,531
Sep-19	MAIZEKHRIF	186
Sep-19	MAIZERABI	2,458
Oct-19	MAIZEKHRIF	466
Oct-19	MAIZERABI	488
Nov-19	MAIZEKHRIF	393
Dec-19	MAIZEKHRIF	393
Feb-20	MAIZE	311
Mar-20	MAIZE	615
Yearly Average OI		
MAIZE		517
MAIZEKHRIF		353
MAIZERABI		4,221

j. Annual average volume to open interest ratio

Symbol	Avg of traded volume(MT)	Average of Open Int (MT)	traded to Open interest
MAIZE	35	517	6.85%
MAIZEKHRIF	9	353	2.41%
MAIZERABI	367	4,221	8.69%

k. Total number of unique members and clients who have traded during the financial year

Symbol	Member Count	Client Count
MAIZE	8	12
MAIZEKHRIF	8	11
MAIZERABI	67	151

l. Ratio of open interest by FPOs/farmers/Hedge/VCP positions to total open interest (Annual average as well as maximum daily value)

	Symbol	VCPs/ Hedger	Proprietary traders	Others
Annual Average	MAIZEKHRIF	0.04%	37.06%	62.90%
	MAIZERABI		26.22%	73.78%
	MAIZE		5.97%	94.03%
Maximum Daily value	MAIZEKHRIF	0.00%	47.54%	52.46%
	MAIZERABI	5.57%	18.40%	76.03%

It is calculated on the day when commodity has highest open interest during the year.
***Commodity wise client categorization is as per category details as provided by the members**.

m. Number of unique FPOs / farmers and VCPs/hedgers who traded in the financial year

Commodity	Count
MAIZEKHRIF	1

Commodity wise client categorization is as per category details as provided by the members.

n. Algorithmic trading as percentage of total trading

Commodity	%
MAIZERABI	1.26%

o. Delivery defaults

MAIZEKHRIF	Number of Instances	2
	Quantity involved (MT)	250
	Value Involved (Cr)	0.52
MAIZERABI	Number of Instances	1
	Quantity involved (MT)	610
	Value Involved (Cr)	1.12

3. Price movements

a. Comparison, correlation and ratio of standard deviation of Exchange futures price vis-à-vis international futures price* (wherever relevant comparable are available).

	MAIZERABI	MAIZEKHRIF
Correlation	0.055	0.115
Standard Deviation	1.186	1.059

CME Corn futures is considered for International futures price

b. Comparison, correlation and ratio of standard deviation of Exchange futures price vis-à-vis international spot price* (wherever relevant comparable are available) and domestic spot price (exchange polled price).

CME Con futures with Domestic spot price

	MAIZEKHRIF	MAIZERABI
Correlation	-0.0355	0.0429
Standard Deviation	0.8535	0.8065

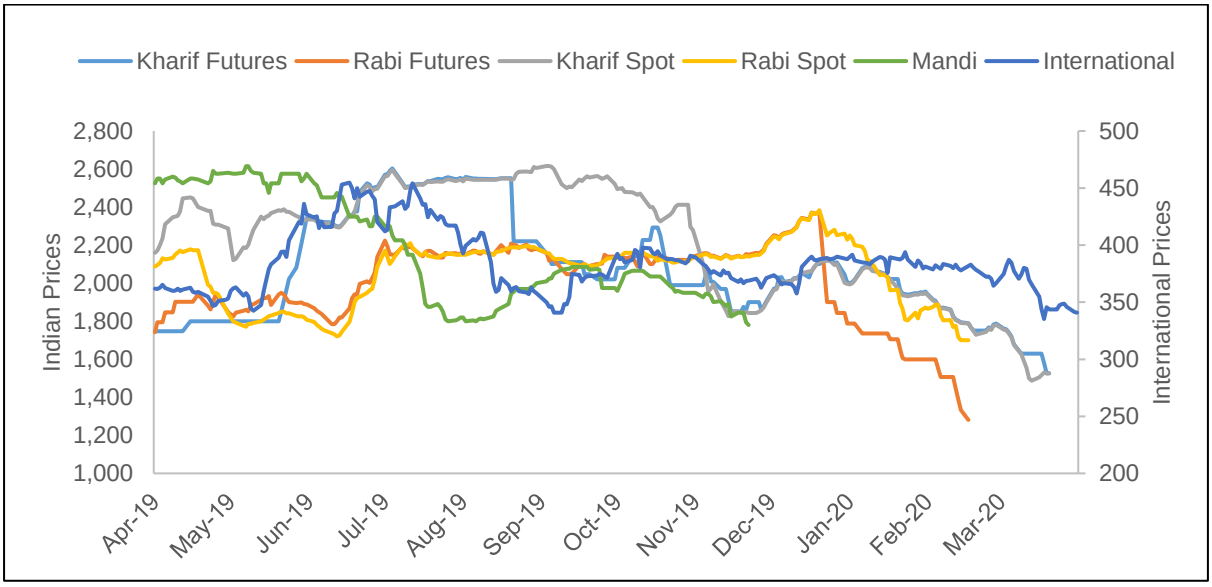
c. Correlation between exchange futures & domestic spot prices along with ratio of standard deviation.

	Symbol	MAIZERABI	MAIZEKHRIF
Correlation	MAIZERABI	0.586	0.158
	MAIZEKHRIF	0.135	0.091
Standard Deviation	MAIZERABI	1.470	1.389
	MAIZEKHRIF	1.313	1.241

d. Correlation between international futures & international spot prices along with ratio of standard deviation (wherever relevant comparable are available).

NA

e. Comparison of Exchange polled price and mandi price (in case of agricultural commodities) / other relevant price (in case non-agricultural commodities) at basis centre.



Compariosn of Maize International Futures, Domestic Futures, Spot and Mandi

f. Maximum & Minimum value of daily futures price volatility and spot price volatility along with disclosure of methodology adopted for computing the volatility. (**Volatility calculated by Square root of Standard Deviation of daily returns for the period from 1 April 2019 to 31 March 2020**)

Volatility	Futures		Spot	
	Month	Value	Month	Value
MAIZEKHRIF				
Max	Oct	0.0308	Nov	0.0211
Min	Apr	0.0072	Aug	0.0039
MAIZERABI				
Max	Nov	0.0195	Apr	0.0238
Min	Apr	0.0053	Aug	0.0034

g. Number of times the futures contract was in backwardation/contango by more than 4% for the near month contract in the period under review

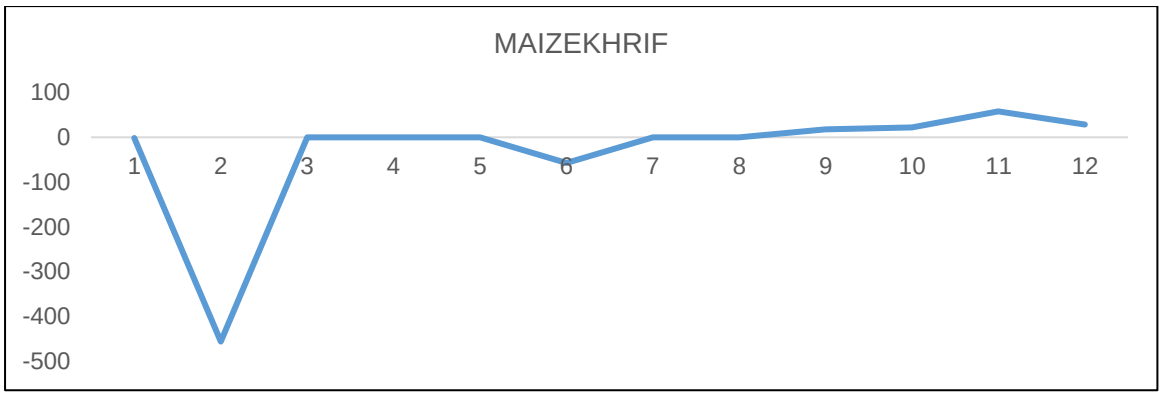
	MAIZEKHRIF	MAIZERABI
Contango	0	1
Backwardation	22	1

4. Other Parameters

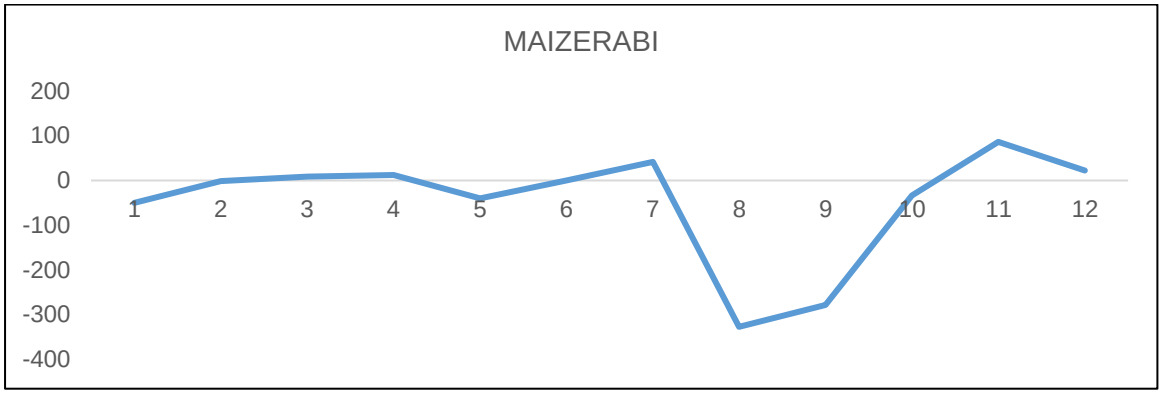
a. Qualitative and quantitative measure for Hedge effectiveness ratio (**Methodology in Annexure I)** and basis Risk (Volatility of Basis) along with disclosure of methodology adopted for such calculations. (**Volatility calculated by Square root of Standard Deviation of daily returns for the period from 1 April 2019 to 31 March 2020**)

Basis Volatilty	
Khaif	7.305
Rabi	5.146

Period	MAIZEKHRIF		MAIZERABI	
	Hedge Ratios	Hedge Efficiency (in percentage)	Hedge Ratios	Hedge Efficiency (in percentage)
Week 1-4	0.41	-1.49	0.28	-49.91
Week 5-8	0.53	-456.74	0.13	-1.67
Week 9-12	0	0	0.07	8.81
Week 13-16	0	0	0.16	11.95
Week 17-20	0	0	0.46	-39.8
Week 21-24	0.3	-57.28	0	0
Week 25-28	0	0	0.75	41.41
Week 29-32	0	0	0.79	-327.29
Week 33-36	0.07	17.89	0.96	-278.45
Week 37-40	0.17	21.94	0.9	-33.77
Week 41-44	0.31	57.96	0.89	86.29
Week 45-48	0.33	28.49	1	22.55



Maize Kharif hedge Efficiency percentage



Maize Rabi hedge efficiency percentage

b. Details about major physical markets of the commodity vis-à-vis market reach in terms of availability of delivery centres (information to be provided state-wise and UT-wise).

State	Major Physical Markets	Availability of NCDEX Delivery center
Telangana	Nizamabad	Basis/ ADC
	Warangal	
	Karimnagar	
	Mahboobnagar	
	Khammam	
Andhra Pradesh	Kurnool	
	Vizianagram	
Bihar	Naugachhia	
	Gulabbagh	Basis/ ADC
	Khagaria	
	Purnea	
Karnataka	Koppal	
	Davangere	
	Ranebennur	
	Bagalkot	
	Gadag	
	Hubli	
	Shimoga	
Maharashtra	Sangli	ADC
	Jalgaon	ADC
	Aurangabad	
Madhya Pradesh	Chhindwara	
Punjab	Khanna	
	Ludhiana	
Tamil Nadu	Namakkal	
Delhi	Delhi	ADC
Gujarat	Ahmedabad	
West Bengal	Kolkatta	

c. Details about major physical markets of the commodity and average Open Interest for each month generated

Note – The OI for each month is classified based on the Member level. The Average OI is on gross level (Long OI + Short OI)

State	Month	Avg Qty(MT)
MAHARASHTRA	Apr-19	7,032
MAHARASHTRA	May-19	10,325
MAHARASHTRA	Jun-19	6,558
MAHARASHTRA	Jul-19	3,803
MAHARASHTRA	Aug-19	2,438
MAHARASHTRA	Sep-19	4,375
MAHARASHTRA	Oct-19	1,056
MAHARASHTRA	Nov-19	434
MAHARASHTRA	Dec-19	338
MAHARASHTRA	Feb-20	183
MAHARASHTRA	Mar-20	891

d. Details, such as number and target audience, of stakeholders' awareness programs carried out by the exchange.

Following list of Awareness programme, Stakeholder engagement programme has conducted for FY 2019-20.

IEP/RS	Location	Category	Actual Participants
Investors Education Programme	Purnia, Gulabbagh (Bihar)	Traders, Farmers, FPO's, Brokers	75
Investors Education Programme	Bhogpur(Jalandhar), Punjab	Farmer , FPO and NABRAD	60
Investors Education Programme	Jalgaon, Maharashtra	FPO & Farmers	35
Investors Education Programme	Mohali, Chandigarh	Farmer Club,FPO and RI	40
Investors Education Programme	Navi Mumbai, Maharashtra	Resource Institution's Team leaders & officials	19
Investors Education Programme	Pathankot (Bundi), Rajasthan	Farmer , FPO and NABRAD	55
Investors Education Programme	Qadian (Gurdaspur), Punjab	Farmer , FPO and NABRAD	50
Investors Education Programme	Hubballi, Karnataka	Deshpande Foundation FPO Team members of Karnataka & Telangana state	11

e. Steps taken / to be undertaken to improve hedging effectiveness of the contracts as well as to improve the performance of illiquid contracts.

- Creating awareness about hedging and targeting the major Masala processors/ Traders/ Stockiest
- Awareness Programme in major trading centres as well as remote location
- One to one meeting with market participants and hedgers

ANNEXURE I

Qualitative and quantitative measure for Hedge effectiveness ratio

Methodology

$$Hedge\ Efficiency = 1 - \frac{Var\ (hedged\ portfolio)}{Var\ (unhedged\ portfolio)}$$

Unhedged portfolio is portfolio comprising of spot commodity, and hedged portfolio is a portfolio comprising of spot commodity and short futures.

If there is no variance reduction, i.e.

$$Var\ (hedged\ portfolio) = Var\ (unhedged\ portfolio)$$

Then,

$$Hedge\ Efficiency = 1 - 1 = 0$$

If spot is completely hedged using futures, then

$$Var\ (hedged\ portfolio) = 0$$

$$Hedge\ Efficiency = 1$$

Position is spot commodity and in futures is not initiated at 1:1. The fraction of position size in futures contract to the position size in spot commodity is called ‘Hedge Ratio’.

So, in this analysis, we are calculating:

$$Hedge\ Efficiency = 1 - \frac{Var\ (spot\ return - hedge\ ratio * futures\ return)}{Var\ (spot\ return)}$$

Weekly returns are used for the analysis. The hedge ratio is calculated based on previous 30 weeks’ data. For example, for week 1 to week 4 of FY19-20, we use last 30 weeks’ data of FY18-19 to compute hedge ratio which had highest hedge efficiency in those 30 weeks. This hedge ratio is then used to compute hedge efficiency for Week 1 – Week 4 of FY 19-20. So, hedge ratio is derived from 30-week rolling basis.

Negative hedge efficiency imply variance has increased by taking position in futures contract. Some of this can be attributed to the fact that spot price is not precisely available at the time of futures closing. So, the timing of generation of these 2 data is different.