

Parameters for Performance Review of Commodity

BARLEY

1. Background

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

Barley is a cereal grain derived from the annual grass *Hordeum vulgare*. It is grown in temperate climates globally. In India, it is grown in Rabi season. The sowing takes place during October to December while harvesting takes place during March-April. Rajasthan, Uttar Pradesh and Madhya Pradesh are the major Barley producing states in India. Barley has been used as animal fodder, as a source of fermentable material for beer and certain distilled beverages, and as a component of various health foods. It is used in soups and stews, and in barley bread of various cultures. Barley grains are commonly made into malt in a traditional and ancient method of preparation. Barley is a key ingredient in beer and whisky production.



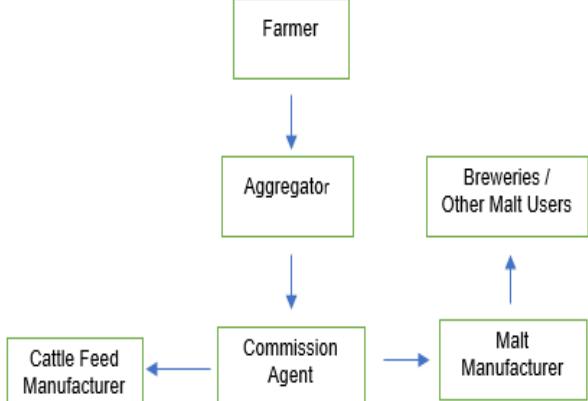
Crop Cycle (India)																													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec																		
Sowing		Harvesting																											
Life Cycle: Value Chain of the Commodity						Major Varieties /Grade																							
						Major Varieties Ratna, Azad (K.125), Vijaya, Amber, RS-6, Jyoti, Clipper, Ranjit, Karan, C- I64, Kailash, Dolma, LSB-2, RDB-1, BG-25, BG-108, Kedar, Neelam, PL-56, Himani																							
						NCDEX Quality Parameters <table border="1"> <tr> <td>Moisture content</td> <td>12% Max</td> </tr> <tr> <td>Damaged</td> <td>4% Max</td> </tr> <tr> <td>Weeviled</td> <td>1% Max</td> </tr> <tr> <td colspan="2" style="text-align: center;">(Extraneous Matter)</td></tr> <tr> <td colspan="2" style="text-align: center;">Not more than 1 % by weight of which not more than 0.25% by weight shall be mineral matter and not more than 0.10 % by weight, shall be impurities of animal origin.</td></tr> <tr> <td>Foreign Matter</td><td></td></tr> <tr> <td>Other food grains</td> <td>1% Max</td> </tr> <tr> <td>Broken Kernels</td> <td>6% Max</td> </tr> <tr> <td>TCW</td> <td>40 gm Basis</td> </tr> </table>						Moisture content	12% Max	Damaged	4% Max	Weeviled	1% Max	(Extraneous Matter)		Not more than 1 % by weight of which not more than 0.25% by weight shall be mineral matter and not more than 0.10 % by weight, shall be impurities of animal origin.		Foreign Matter		Other food grains	1% Max	Broken Kernels	6% Max	TCW	40 gm Basis
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Table: Reference Years for Commodities

Sl. No.	A	B	C
Crop Season	Kharif	Kharif (Long Duration crop)	Rabi
Crops	Paddy, Maize, Bajra, Moong, Soybean, Guar seed, Kapas, Sesame Seed	Castor seed and Turmeric	Wheat, Barley, Chana, RM Seed, Coriander, Jeera
Relevant Processed commodities	Guar gum, Soybean meal, Soy oil, Cotton, Cotton seed Oil cake, Gur, CPO	Castor Oil	-
Sowing Time	July onwards	July onwards	October onwards
Harvesting Time	Oct onwards	Jan onwards	March onwards
Reference Year Financial Year 2022-23 (Apr-Mar)			
Corresponding Years			
Production Year (PY)	2022-23 (July-Sept)	2021-22 (July-June)	2021-22 (July-June)
Marketing Year (MY)	2022-23(Oct-Sept)	2022-23 (Jan/Feb-Dec/Jan)	2022-23 (Mar/Apr - Feb/Mar)
Calendar Year (CY)	2022 (Jan-Dec)	2022 (Jan-Dec)	2022 (Jan-Dec)
Relationship b/w Various Years	Current Financial Year = Current Production Year = Current Marketing Year = Calendar Year	Current Financial Year = Previous Production Year = Current Marketing Year = Current Calendar Year	Current Financial Year = Previous Production Year = Current Marketing Year = Current Calendar Year
Example	FY 2022-23= PY 2022-23= MY 2022-23= CY 2022	FY 2022-23= PY 2021-22 = MY 2022-23= CY 2022	FY 2022-23= PY 2021-22 = MY 2022-23= CY 2022

Note: Coffee is a plantation crop; hence, it is not classified under either Kharif or Rabi season in the above table.

Explanatory Notes:

- India is a vast country and various crops are sown and harvested at different point of time. However, two major crop seasons, are there i.e. Kharif & Rabi. Apart from it, Zaid/Summer season is also there.
- Crop seasons are classified based upon sowing time. Normally Kharif season sowing starts from mid-June/July and new crop arrivals begin from Oct/Nov. However, early/late sowing/harvesting also takes place. Rabi season sowing usually takes place mainly from October/November and harvesting starts from March/April. Early/late sowing/harvesting also takes place. Summer crops/Zaid crops are short duration crops mainly sown during January-March and harvested during April-June.
- “Production Year” is considered as “July to June”. With the start of monsoon rains during June/July the sowing of Kharif season starts and they are harvested during Sept/Oct. From Oct onwards the sowing of Rabi season crops starts and harvesting usually takes place during March/April. Thus, a single production cycle completes between July-Sept period covering Kharif, Rabi and Zaid crops. Thus production year remains same for all season crops and the period corresponds to July-Sept.
- “Marketing Year” for each crops starts from beginning of the harvest time i.e. from start of new crop produce arrivals in the market. Thus, for Kharif crops Marketing Year is generally considered as “October to September”, while for Rabi crops Marketing Year is considered as “April to March”. However, Marketing Year may vary slightly for some of the crops depending upon early/late maturity/harvesting.

- For processed commodities, their production starts after the start of new season crop arrivals of their underlying crop.

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 (2021-22)	Current FY (2022-23)
Opening Stocks	207.93	183.58
Production	1459.63	1519.58
Imports	301.29	298.07
Total Supply	1968.85	2001.23
Exports	324.13	300.13
Domestic Consumption	1461.00	1515.81
Closing Stocks	183.58	185.29

Source: USDA (April 2023)

(In Lakh Tonnes)

Indian Scenario	Previous FY (2021-22)	Current FY (2022-23)
Opening Stocks	1.13	1.15
Production	16.56	13.70
Imports	0.48	2.50
Total Supply	18.17	17.35
Exports	0.02	0.05
Domestic Consumption	17.00	16.00
Closing Stocks	1.15	1.30

Source: USDA (April 2023)

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

(In Lakh Tonnes)

Rank	Top 10 Major Producing Countries			Top 10 Major Consuming Countries		
	Country	Previous FY (2021-22)	Current FY (2022-23)	Country	Previous FY (2021-22)	Current FY (2022-23)
1	European Union	520.5	517.99	European Union	454.50	480.00
2	Russia	175.05	215.00	Russia	143.00	161.00
3	Australia	143.37	141.00	China	114.00	111.00
4	Ukraine	99.23	61.00	Turkey	74.00	85.00
5	Canada	69.84	99.87	United Kingdom	63.80	61.21
6	United Kingdom	69.61	74.00	Australia	60.00	60.00
7	Argentina	53.00	45.00	Canada	53.99	70.00
8	Turkey	45.00	74.00	Iran	47.00	55.00
9	Morocco	27.80	7.00	Saudi Arabia	42.25	45.25
10	Iran	27.00	30.00	Ukraine	40.00	38.00
	Others	229.23	254.72	Others	368.60	349.35
	World	1459.63	1519.58	World	1461.14	1515.81

Source: USDA (April 2023)

(In Lakh Tonnes)

Rank	Top 10 Major Exporting Countries			Top 10 Major Importing Countries		
	Country	Previous FY	Current FY	Country	Previous FY	Current FY
		(2021-22)	(2022-23)		(2021-22)	(2022-23)
1	Australia	80.07	80.00	China	82.82	90.00
2	European Union	73.31	58.00	Saudi Arabia	42.00	43.00
3	Ukraine	57.05	25.00	Turkey	28.67	16.00
4	Argentina	39.00	27.00	Iran	16.00	25.00
5	Russia	33.00	53.00	Jordan	12.78	11.00
6	Canada	19.81	29.00	Japan	11.84	12.00
7	United Kingdom	7.64	10.00	European Union	9.91	20.00
8	Kazakhstan	4.27	10.00	Morocco	9.65	3.50
9	Uruguay	2.62	1.50	Tunisia	9.09	6.50
10	Turkey	1.73	3.00	Algeria	7.72	3.50
	Others	5.63	3.63	Others	70.81	67.57
	World	324.13	300.13	World	301.29	298.07

Source: USDA (April 2023)

Countries are arranged in descending order based on the figure in Current FY-2022-23

Top 10 Major Producing States in India			
Rank	States	Previous FY (2019-20)	Current FY (2020-21)
1	Rajasthan	8.13	9.79
2	Uttar Pradesh	4.55	5.23
3	Madhya Pradesh	1.64	0.64
4	Haryana	0.58	0.47
5	Uttarakhand	0.33	0.34
6	Himachal Pradesh	0.36	0.31
7	Punjab	0.25	0.23
8	Bihar	0.28	0.10
9	Jammu & Kashmir	0.05	0.04
10	Maharashtra	0.12	0.04
	Others	0.04	0.03
	All India	16.33	17.22

Source: Ministry of Agriculture,

State wise latest data is available only up to FY 2020-21.

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

c. Major changes in the polices governing trade in the spot markets of the commodity (FY 2022-23)

Date	Major Policies governing trade and related changes
19-May-22	Release of 3rd Advance Estimate of Production: 2021-22 output at 15.90 lakh MT – A decline of 4% on y-o-y basis.
17-Aug-22	Release of 4th Advance Estimate of Production: 2021-22 output at 13.60 lakh MT – A decline of 18% on y-o-y basis.

d. Geo political issues in the commodity and its impact on Indian scenario (FY 2022-23)

Ukraine and Russia are the among major barley exporters in world market. Geo-political tension between these countries have affected world market trade. However, India is not a major importer of Barley.

2. Trading related Parameter
a. Monthly and Annual traded volume (quantity in appropriate units)

Month	Year	Symbol	Traded volume (MT)
Apr	2022	BARLEYJPR	30
May	2022	BARELYJPR	-
June	2022	BARLEYJPR	-
July	2022	BARELYJPR	-
August	2022	BARLEYJPR	-
September	2022	BARELYJPR	-
October	2022	BARLEYJPR	-
November	2022	BARELYJPR	-
December	2022	BARLEYJPR	-
January	2023	BARELYJPR	-
February	2023	BARLEYJPR	-
March	2023	BARELYJPR	-
Annual Traded Volume (MT) (April'22 to March'23)			30

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

Symbol	Traded Volume (MT)	Deliverable Supply(MT)	Proportion
BARLEYJPR	40.00	1,735,000	0.00

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

Symbol	Traded volume (MT)	Production(MT)	Proportion
BARLEYJPR	40	1,370,000	0.00

d. Annual average Open interest as proportion of total production

Symbol	Average Open Interest (MT)	Production(MT)	Proportion
BARLEYJPR	0.84	1,370,000	0.00

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

Symbol	Average Open Interest (MT)	Deliverable supply(MT)	Proportion
BARLEYJPR	0.84	1,735,000	0.00

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

Month	Year	Symbol	Traded value (in Rs. Crores)
April	2022	BARLEYJPR	0.12
May	2022	BARLEYJPR	-
June	2022	BARLEYJPR	-
July	2022	BARLEYJPR	-
August	2022	BARLEYJPR	-
September	2022	BARLEYJPR	-
October	2022	BARLEYJPR	-
November	2022	BARLEYJPR	-
December	2022	BARLEYJPR	-
January	2023	BARLEYJPR	-
February	2023	BARLEYJPR	-
March	2023	BARLEYJPR	-
Annual Traded Volume (in Rs Crores) (April'22 to March'23)			0.12

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

Expiry Month	Year	Symbol	Total Delivery (in MT)
April	2022	BARLEYJPR	-
May	2022	BARLEYJPR	-
June	2022	BARLEYJPR	-
July	2022	BARLEYJPR	-
August	2022	BARLEYJPR	-

September	2022	BARLEYJPR	-
October	2022	BARLEYJPR	-
November	2022	BARLEYJPR	-
December	2022	BARLEYJPR	-
January	2023	BARLEYJPR	-
February	2023	BARLEYJPR	-
March	2023	BARLEYJPR	-
Annual value of delivery (in MT) (April'22 to March'23)			-

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

Expiry Month	Year	Symbol	Total Delivery Value (in Cr)
April	2022	BARLEYJPR	-
May	2022	BARLEYJPR	-
June	2022	BARLEYJPR	-
July	2022	BARLEYJPR	-
August	2022	BARLEYJPR	-
September	2022	BARLEYJPR	-
October	2022	BARLEYJPR	-
November	2022	BARLEYJPR	-
December	2022	BARLEYJPR	-
January	2023	BARLEYJPR	-
February	2023	BARLEYJPR	-
March	2023	BARLEYJPR	-
Annual value of delivery (in Crores) (April'22 to March'23)			-

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

Month	Year	Symbol	Average Open Interest (MT)
Apr	2022	BARLEYJPR	11.05
May	2022	BARLEYJPR	-
June	2022	BARLEYJPR	-
July	2022	BARLEYJPR	-
August	2022	BARLEYJPR	-
September	2022	BARLEYJPR	-

October	2022	BARLEYJPR	-
November	2022	BARLEYJPR	-
December	2022	BARLEYJPR	-
January	2023	BARLEYJPR	-
February	2023	BARLEYJPR	-
March	2023	BARLEYJPR	-
Annual Average OI (MT) (April'22 to March'23)			0.84

j. Annual average volume to open interest ratio

19.05%

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

Symbol	Member Count	Client Count
BARLEYJPR	2	3

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

Annual Average	N/A
Maximum Daily Value	0.00%

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

Commodity	Count
BARLEYJPR	0

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

n. Algorithmic trading as percentage of total trading

Commodity	%
BARLEYJPR	0

o. Delivery defaults

Number of instances	0
Quantity involved	0
Value involved	0

3. Price Movement

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

Not Available

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).

Not Available

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

Correlation			
	Futures	Spot	Mandi
Futures	1		
Spot	0.536497	1	
Mandi	0.085562	0.094179	1

Standard Deviation			
	Futures	Spot	Mandi
Futures		1	0.945467
Spot	1.057679		5.276611
Mandi	0.189516	0.179181	1

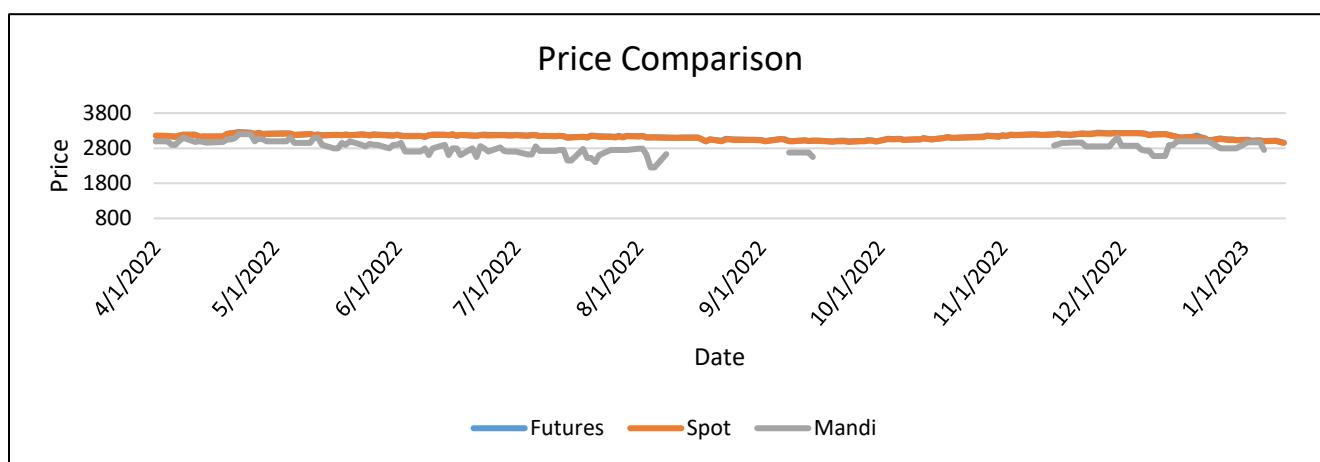
d. Correlation between international futures & international spot prices along with ratio of standard deviation (wherever relevant comparable are available).

Not Available

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.

Correlation			
	Futures	Spot	Mandi
Futures	1		
Spot	0.536497	1	
Mandi	0.085562	0.094179	1

Standard Deviation			
	Futures	Spot	Mandi
Futures		1	0.945467
Spot	1.057679		5.276611
Mandi	0.189516	0.179181	1



Spot and Future Prices: NCDEX, Mandi Prices: Agmarknet

f. Maximum & Minimum value of daily futures price volatility and spot price volatility along with disclosure of methodology adopted for computing the volatility.

Volatility	Futures		Spot	
	Month	Value	Month	Value
Max	Mar	0.021	Mar	0.022
Min	May	0.006	May	0.005

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.

Contango by more than 4% for near month contract	1
Backwardation by more than 4% for near month contract	23

4. Other Parameters

a. Qualitative and quantitative measure for Hedge effectiveness ratio and basis Risk (Volatility of Basis) along with disclosure of methodology adopted for such calculations

	BARLEY
Basis Volatility	17.26
Hedge efficiency	0.013

The methodology for hedge efficiency ratio calculation is appended as Annexure 1

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

State	Major Physical Markets	Availability of NCDEX Delivery center
Rajasthan	Jaipur	Basis Center
	Ganganagar	ADC (Sri Ganganagar)
	Sikar	NA
	Hanumangarh	NA
	Alwar	NA
Madhya Pradesh	Chhatarpur	NA
	Shivpuri	NA
	Tikamgarh	NA
	Satna	NA
	Neemuch	NA
Uttar Pradesh	Agra	NA
	Aligarh	NA
	Kanpur	NA
	Jhansi	NA
	Hamirpur	NA
	Others	NA
Haryana	Jind	NA
	Sirsa	NA
	Gurgaon	NA
	Bhiwani	NA

b. Details about major physical markets of the commodity and average Open Interest for each month generated from those regions.

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

Month	Uttar Pradesh	Rajasthan
Apr-22	6	12
May-22	-	-
Jun-22	-	-
Jul-22	-	-
Aug-22	-	-
Sep-22	-	-
Oct-22	-	-
Nov-22	-	-
Dec-22	-	-
Jan-23	-	-
Feb-23	-	-
Mar-23	-	-

Note - The OI for CP (Custodian Participant) is not mapped to any State/ location and hence not considered in the above data.

c. 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 2022-23

Sr. Number	Programme	Location	Number of Participants
1	Awareness Programme	Sriganganagar, Rajasthan	57
2	Awareness Programme	Laxmangarh, Rajasthan	62
3	Awareness Programme	Niwai	22
4	Awareness Programme	Govindgarh, Jaipur	50
5	Awareness Programme	Tonk, Rajasthan	107
6	Awareness Programme	Mathura, Uttar Pradesh	61
7	Awareness Programme	Narayanpur(Hindaun)	80
8	Awareness Programme	Kherli (Alwar)	60
9	Awareness Programme	Deeg	50
10	Awareness Programme	Nadbai	60
11	Awareness Programme	Bansur	60
12	Awareness Programme	Jaipur	65
13	Awareness Programme	Mokhampura	58
14	Awareness Programme	Village Mirjewala	90
15	Awareness Programme	Kolkata	35
16	Awareness Programme	Surat	18
17	Awareness Programme	Guna, Madhya Pradesh	30
18	Awareness Programme	Anjar, Lutch, Gujarat	38
19	Awareness Programme	Raipur, Chhattisgarh	112
20	Awareness Programme	Patan, Gujarat	104
21	Awareness Programme	Nashik	200
22	Awareness Programme	Udaipur	150

23	Awareness Programme	Rajkot	100
24	Awareness Programme	Hissar	100
25	Awareness Programme	Nagpur, Maharashtra	120
26	Awareness Programme	Raipur	100
27	Awareness Programme	Gwalior, Madhya Pradesh	78
28	Awareness Programme	Bhopal , MP	54
29	Awareness Programme	Indore, Madhya Pradesh	47
30	Awareness Programme	Siliguri, West Bengal	39
31	Awareness Programme	Alipurduar, West Bengal	31
32	Awareness Programme	Meerut, Uttar Pradesh	30
33	Awareness Programme	Bhopal, Madhya Pradesh	44
34	Awareness Programme	Indore, Madhya Pradesh	80
35	Awareness Programme	Chennai, Tamil Nadu	24
36	Awareness Programme	Kanpur, Uttar Pradesh	60
37	Awareness Programme	Chhindwara, MP	50
38	Awareness Programme	Seoni , MP	40
39	Awareness Programme	Kolkata	25
40	Awareness Programme	Raipur, Chattisgarh	136
41	Awareness Programme	Lucknow	177
42	Awareness Programme	Rourkela	65
43	Awareness Programme	Muzaffarnagar	70
44	Awareness Programme	Kochi	86
45	Awareness Programme	Bhilai	70
46	Awareness Programme	Thalamedla	80
47	Awareness Programme	Kolkata	45
48	Awareness Programme	Online	30
49	Awareness Programme	Online	18
50	Awareness Programme	Online	23
51	Awareness Programme	Odisha	9
52	Awareness Programme	Odisha	15
53	Awareness Programme	Karnataka	5
54	Awareness Programme	Bihar	18
55	Awareness Programme	West Bengal	6
56	Awareness Programme	Andhra Pradesh	29
57	Awareness Programme	Online	11
58	Awareness Programme	Online	7
59	Awareness Programme	Online	21
60	Awareness Programme	Online	6
61	Awareness Programme	Online	9
62	Awareness Programme	Online	14
63	Awareness Programme	Online	82
64	Awareness Programme	Online	28
65	Awareness Programme	Online	25
66	Awareness Programme	Online	50
67	Awareness Programme	Online	30
68	Awareness Programme	Online	25
69	Awareness Programme	Online	5
70	Awareness Programme	Online	10
71	Awareness Programme	Online	7
72	Awareness Programme	Online	13
73	Awareness Programme	Online	16
74	Awareness Programme	Online	23
75	Awareness Programme	Online	53

76	Awareness Programme	Online	17
77	Awareness Programme	Online	30
78	Awareness Programme	Online	15
79	Awareness Programme	Online	25
80	Awareness Programme	Online	35
81	Awareness Programme	Online	10
82	Awareness Programme	Online	30
83	Awareness Programme	Online	12
84	Awareness Programme	Online	6
85	Awareness Programme	Online	7
86	Awareness Programme	Online	20
87	Awareness Programme	Online	50
88	Awareness Programme	Online	30
89	Awareness Programme	Online	13
90	Awareness Programme	Online	10
91	Awareness Programme	Online	6
92	Awareness Programme	Online	6
93	Awareness Programme	Online	8
94	Awareness Programme	Online	13
95	Awareness Programme	Online	6
96	Awareness Programme	Online	25
97	Awareness Programme	Online	8
98	Awareness Programme	Online	14
99	Awareness Programme	Online	11
100	Awareness Programme	Online	10
101	Awareness Programme	Online	6
102	Awareness Programme	Online	9
103	Awareness Programme	Online	14
104	Awareness Programme	Online	16
105	Awareness Programme	Online	11
106	Awareness Programme	Online	8
107	Awareness Programme	Online	8
108	Awareness Programme	Online	13
109	Awareness Programme	Online	15
110	Awareness Programme	Online	25
111	Awareness Programme	Online	25
112	Awareness Programme	Online	26
113	Awareness Programme	Online	18
114	Awareness Programme	Online	52
115	Awareness Programme	Online	16

d. 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 processors/ Traders/ Stockiest
- Awareness Programme in major trading centres as well as remote location
- One to one meeting with market participants and hedgers

5. Any other information to be disclosed as deemed important by the exchange or as suggested by the PAC

N.A

ANNEXURE I

Qualitative and quantitative measure for Hedge effectiveness ratio

Methodology

Regression analysis is carried out between near month futures returns and NCDEX polled spot prices returns of the FY2022-23.

The R-Square value of the Regression analysis represents the "**Hedging Efficiency**".

Note: -

Date for which spot prices were not available is not used for analysis.

Weekly returns are used for performing Regression Analysis.

The method used to calculate Hedging Efficiency does not consider liquidity risk because of this reason illiquid commodities can have high hedging efficiency.

References:

Ghosh, Ph.D, Nilanjan & Dey, Debojyoti & Moulvi, Nazir & Jain, Niteen & Sinha, Neha & Rachuri, Sarika. (2013). Hedging Efficiency-Measures and Empirical Study.