भारतीय मानक **IS 6692 : 2024**

Indian Standard

मवेशियों का दूध दर्ज करने की पद्धति

(पहला पुनरीक्षण)

Method of Milk Recording of Cattle

(First Revision)

ICS 65.020.30

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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Animal Husbandry and Equipment Sectional Committee, FAD 32

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Animal Husbandry and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

Capacity for milk production is one of the criteria for assessing the genetic qualities of cattle. This capacity is assessed from systematic records of the amount of milk produced and of one or more of the quality characteristics of the milk, that is, butterfat content, solids-non-fat (SNF), protein content, etc. Information about milk production is the most preferred trait in India to judge cattle. Systematic records of the amount of milk produced and milk components like butterfat content, solids-non-fat, protein content, etc. and their rational utilization, to assess the capacity for milk production of herd of cattle, constitutes what is known as milk recording.

Milk recording fulfils a two-fold purpose:

a) at the level of the individual farmer, it provides an objective means of selection of the females under test based on the breeding/genomic breeding values, quantity, and quality of their milk, and permits a more efficient management of the herd, technically and economically; and

b) at the collective level, it contributes to the characterization of a given breed, to the determination of the breeding/genomic breeding value of a sire, and to research activities generally on questions related to genetics and economics.

The milk recording practices described in this standard should be carried out by either:

Method A — That is, exclusively by qualified and trained staff attached to the controlling authority; or

Method B — That is, by the owner of the cattle or his representative, in collaboration with the controlling authority.

Records collected by owner/farmers may be used for herd management and ration formulation, etc.

The form in which milk recording data are presented, and their interpretation, demand a rigorous standardization of the various operations assigned to the recorders. Standardization of the general organization of the control work to meet the animal husbandry requirements and those associated with the mechanical processing of the data in question should be desirable.

Finally, the standardization is required especially for selling breed stock on a well-organized basis.

This standard should be applied widely in the country for indicating the capacity of milk production of milch cattle on a scientific basis and better assessment of collective yields of large herds. This standard is applicable to cattle of normal lactation period.

This standard was originally published in 1972, in this revision a significant reference is taken from ‘Guidelines for dairy cattle milk recording’ of International Committee for Animal Recording (ICAR) where the following major changes have been done:

a) The scope has been expanded to include SNF and protein in the standard;

b) The operational year method has been removed; and

c) Frequency of milk recording has been modified where the limits for time interval between two successive recordings have been changed.

(*Continued on third cover*)

Indian Standard

METHOD OF MILK RECORDING OF CATTLE

(First Revision)

1 SCOPE

This standard describes the method of milk recording for all cattle breeds. It concerns, however, only to milk, fat, SNF and protein production.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 1224 (Part 1) : 1977	Determination of fat by the Gerber method: Part 1 Milk (*first revision*)
IS 10083 : 1982	Method of test for determination of SNF (solids-not-fat) in milk by the use of the lactometer
IS 11917 : 2018/ ISO 8968- 1 : 2014	Milk and milk products — Determination of nitrogen content — Kjeldahl principle and crude protein calculation (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Cattle — It includes cows and buffaloes.

3.2 Herd — A group of cattle kept for the same purpose, belonging to the same owner, and accommodated in the same group of farm buildings.

3.3 Trained Personnel — A person who is aware about milk recording method (to be carried out at monthly, three weekly or fortnightly) and trained in capturing milk yield using global positioning system (GPS) enabled smart weighing scale (digital) or a weighing machine (graduated in units of not more than 100 g) and collection of milk samples for milk component analysis.

4 GENERAL PRINCIPLE

Determination of the total milk, butterfat, SNF, and protein production of the cattle during her successive lactations throughout her life, from the data obtained at selected time intervals, without any correction or modification, for the quantity of milk and of fat, SNF and protein produced over 24 h periods.

5 RECORDING STAFF

Trained personnel should carry out milk recording.

6 TECHNIQUE OF MILK RECORDING

6.1 Duration

Each periodical milk recording operation should extend over a period of 24 h and an exhaustive milking should be carried out every time that it is felt necessary.

NOTE — Milking carried out at the normal time interval immediately preceding the milking, which are the subject of the daily recording in question. The results of this milking are noted but not normally included in the calculation.

6.2 Determination of the Quantity of Milk Produced

By means of GPS enabled smart weighing scale (digital) or a weighing machine graduated in units of not more than 100 g, which is approved by the authorities responsible for supervising the milk recording practices and tested/calibrated periodically, determine the mass of milk collected at the usual milking times from the cattle under test, during 24 h. Express the result in kilograms, to one decimal place.

6.3 Determination of Fat, SNF and Protein

6.3.1 *Constitution of the Sample*

At each milking, draw a sample after complete milking and thorough mixing of the milk from individual cattle. Approximately, 40 ml to 50 ml milk should be collected as sample for milk component analysis. Milk testing for components

should be done for individual milking session of the day (24 h). Components should be estimated by taking weighted average of all the milking session of the day.

6.3.2 *Keeping of the Samples*

It is important that the milk be kept under conditions in which it cannot deteriorate. One method of ensuring this is to maintain it at a temperature as close to 4 °C but above 0 °C. Another method is to add a preservative to the milk (for instance, potassium dichromate or bronopol in the proportion of 1 g per litre of milk). In the second method, provision should be made for the treated milk to have a distinctive colour to avoid it being mistaken for untreated milk. Moreover, should the additive be highly toxic, the receptacle containing the treated milk should be clearly marked to identify it.

6.3.3 Determine the butterfat content of the average sample by the Gerber method [*see* IS 1224 (Part 1)] or milk component analyzers.

6.3.4 Determine the SNF content of the average sample using lactometer as per the method given in IS 10083.

6.3.5 Determine the protein content of the average sample as per the method given in IS 11917.

6.3.6 Fat, SNF and protein may also be determined by FTIR (fourier transform infrared spectroscopy) based instrument. However, if any there is any dispute between the results from this method and methods mentioned in 6.3.3, 6.3.4 and 6.3.5, methods given in standards will only be taken as the referee methods

7 FREQUENCY OF RECORDING

7.1 A record of the quantity of milk and of butterfat, SNF and protein produced in 24 h should be made at least once a month. The time interval between two successive recordings should be within the following extreme limits:

a) 22 to 37 days, for monthly recording;

b) 16 to 26 days, for three-weekly recording; and

c) 10 to 18 days, for fortnightly recording.

However, first recording should be taken between 5 to 25 days post calving.

7.2 The same recording intervals should, as a general rule, be maintained throughout the period of lactation. Any departure from this rule should be recorded in the report.

8 DURATION OF CONTROL

8.1 Following criterion should be followed in milk recording over the whole of the lactation period:

a) The control should be exercised during the whole lactation period;

b) The lactation period is taken as beginning on the first day after calving;

c) Milk-butterfat, SNF and protein control (weighing of milk, sampling for analysis) should not be carried out before the 5th day and after 25th day post calving;

d) The lactation period is considered to have ended when the cattle are no longer milked for consecutive three days. In this case, the dry off date should be collected from farmer. If not available, following may be considered as dry off date:

1) In the case of fortnightly control, as the seventh day;

2) In the case of three-weekly control, as the tenth day; and

3) In the case of monthly control, as the fourteenth day after the last normal recording, the day in question being included in the calculation.

8.2 Lactations may, however, be calculated for as long as the cattle with over 1/2 kg of milk daily are milked regularly at least once a day for a period longer than one week.

9 REFERENCE LACTATION PERIOD

9.1 In order to be able to compare the milking value of cattle, the lactation periods of which are different but exceed 305 days, a period designated as the reference period, corresponding to the first 305 days of lactation, should be taken as the basis of comparison.

9.2 Actual milk yield along with days in milk and standard 305 days lactation yield should be provided for the following categories:

a) Cattle registered in *Bharat Pashudhan* app data base/INAPH;

b) Cattle entered in the grading register;

c) Cattle which, on account of their descent and performance, have the right to be

entered in the herd book or in the grading register; or

d) Cattle which, on account of their descent and performance, have the right to be issued with an official pedigree certificate.

10 EXPRESSION OF RESULT

10.1 Methods of Calculation

The total quantity of milk and butter fat, SNF and protein as well as the percentage of butter fat, SNF and protein in the milk, can be calculated from the data collected during milk recording, as given in the Annex A. A practical worked out example is given in Annex B.

NOTE — The total masses of milk and of butterfat should be expressed in kilograms, the figure being obtained from the calculated value by rounding it to the whole number immediately above it if the first decimal is 5 or more, otherwise to the whole number below. The percentage of butterfat, SNF and protein in the milk should be rounded to two decimal places on the same principle.

10.2 Remarks

10.2.1 If, owing to vis major (paid holidays for instance), the recording is suspended for a period not exceeding 60 days, the missing figure or figures may be replaced by the means of the results of the recordings immediately before and after it. If the interruption exceeds 60 days, such averages shall not be recognized, lactation yield estimated using such records should be considered invalid.

10.2.2 The result obtained by the method of calculation given in Annex A should be registered without any correction or modification whatsoever.

11 MILK-RECORDING REPORT

The milk-recording report shall record the results obtained, without modification or correction. It should also mention:

a) Which method was used for carrying out the milk-recording (for example, Method A or Method B);

b) Details establishing the identity of the animal;

c) The factors liable to affect the yield, in particular:

1) The date of birth of the cattle, in years and months, according to the registration in the herd book (each month begun counting as a whole month);

NOTE — Cattle for which the date of birth is not known, the age should be estimated from an examination of the teeth/based on date provided by Farmer.

2) The number of daily milkings;

3) The exact dates of calving;

4) The duration of each previous lactation;

5) The total production of milk and of fat, in kilograms, obtained in each previous lactation, and the corresponding percentages of fat, SNF and protein;

6) If possible, the duration of mammary repose (dry period) previous to each calving; and, optionally:

i) The method of milking (by hand or mechanical);

ii) The nature of the diet;

iii) The state of health (any accidents or diseases which have occurred during the lactation period or previously); and

iv) The special environmental conditions: stabling, lowland or mountain pasturage (altitude of mountain pastures, duration of mountain grazing), possible utilization for work;

d) Intervals between recordings in days (in Hindu-Arabic numerals); and

NOTE — Where milk recording is not always carried out at the same time as butterfat recording, the intervals between the butterfat recordings should be indicated separately in days;

e) Whether the frequency of testing has been changed in the course of the lactation period.

ANNEX A

(*Clauses* 10.1 *and* 10.2.2)

TEST INTERVAL METHOD FOR CALCULATING THE TOTAL QUANTITY OF MILK AND OF BUTTERFAT, SNF, PROTEIN AND THE AVERAGE PERCENTAGE OF BUTTER FAT, SNF AND PROTEIN

A-1 TEST INTERVAL METHOD

Let,

M_1, M_2, …….., Mn be the masses, in kilograms, given to one decimal place, of milk weighed in 24 h testing's C_1, C_2, ... C_n;

m_1, m_2,…….m_n, the masses, in kilograms, given to two decimal places, of the butterfat/SNF/protein determined during these testings;

I_1, I_2, …….. I_{n-1}, the intervals in days between testings C_1 and C_2, $C2$ and C_3, ... C_{n-1}, and C_1;

I_0 the interval in days between calving and the first testing;

I_n the interval in days between the last testing and the end of the period of milk recording.

The total mass, in kilograms, of milk produced during the lactation is equal to:

$$S = I_0 M_1 + I_1\left(\frac{M_1 + M_2}{2}\right) + I_2\left(\frac{M_2 + M_3}{2}\right) + \ldots + I_{N-1}\left(\frac{M_{n-1} + M_n}{2}\right) + I_n Mn$$

The corresponding total mass, in kilograms, of butterfat/SNF/protein produced is equal to:

$$s = I_0 m_1 + I_1\left(\frac{m_1 + m_2}{2}\right) + I_2\left(\frac{m_2 + m_3}{2}\right) + \ldots + I_{n-1}\left(\frac{m_{n-1} + m_n}{2}\right) + I_n m_n$$

The average percentage of butterfat/SNF/protein in the milk is equal to:

$$s \times \frac{100}{S}$$

If the number of days of lactation is greater than 305, give the results corresponding to the first 305 days.

ANNEX B

(*Clause* 10.1)

A TYPICAL EXAMPLE OF DATA RECORDING AND CALCULATION

B-1 DATE OF CALVING: 25 MARCH 2024

Date of the Recordings	*Interval, Days*	*Quantity of Milk, kg*	*Butterfat, percent*	*Butterfat, kg*	*SNF, percent*	*SNF, kg*	*Protein, percent*	*Protein, kg*
7/8 April	14	28.2	3.65	1.029	8.40	2.369	3.30	0.931
6 May	28	24.8	3.45	0.856	9.30	2.306	3.50	0.868
5 June	30	26.6	3.40	0.904	11.30	3.006	3.20	0.851
7 July	32	23.2	3.55	0.824	11.70	2.714	3.00	0.696
2 August	26	20.2	3.85	0.778	10.50	2.121	3.30	0.667
30 August	28	17.8	4.05	0.721	8.30	1.477	3.80	0.676
25 September	26	13.2	4.45	0.587	7.90	1.043	3.20	0.422
27 October	32	9.6	4.65	0.446	6.20	0.595	3.70	0.355
22 November	26	5.8	4.95	0.287	5.20	0.302	3.80	0.220
20 December	28	4.4	5.25	0.231	4.90	0.216	3.40	0.150
	14							

Commencement of lactation — 26 March 2023
End of lactation — 3 January 2023
Number of days of lactation — 284
Number of testing — 10

B-2 CALCULATION

B-2.1 Milk

The total mass of milk (M) produced during the lactation is:

$$M = (14\times 28.2) + 28\left(\frac{28.2+24.8}{2}\right) + 30\left(\frac{24.8+26.6}{2}\right)$$

$$+ 32\left(\frac{26.2+23.2}{2}\right) + 26\left(\frac{23.2+20.2}{2}\right) + 28\left(\frac{20.2+17.8}{2}\right)$$

$$+ 26\left(\frac{17.8+13.2}{2}\right) + 32\left(\frac{13.2+9.6}{2}\right) + 26\left(\frac{9.6+5.8}{2}\right)$$

$$+ 28\left(\frac{5.8+4.4}{2}\right) + (14 \times 4.4)$$

$$= 4\,974 \text{ kg}$$

B-2.2 Butterfat

The total mass of butterfat (B) produced during the lactation is:

$$B = 14\times 1.029 + 28\left(\frac{1.029+0.856}{2}\right) + 30\left(\frac{0.856+0.904}{2}\right)$$

$$+ 32\left(\frac{0.904 + 0.824}{2}\right) + 26\left(\frac{0.824 + 0.778}{2}\right) + 28\left(\frac{0.778 + 0.721}{2}\right)$$

$$+ 26\left(\frac{0.721 + 0.587}{2}\right) + 32\left(\frac{0.587 + 0.446}{2}\right) + \left(\frac{0.446 + 0.287}{2}\right)$$

$$+ 28\left(\frac{0.287 + 0.231}{2}\right) + (14 \times 0.231)$$

$$= 190 \text{ kg}$$

The average percentage of butterfat (b) in the milk is:

$$b = \frac{190 \times 100}{4\,974} = 3.82 \text{ percent}$$

B-2.3 SNF

The total mass of SNF (F) produced during the lactation is:

$$F = 14 \times 2.369 + 28\left(\frac{2.369 + 2.306}{2}\right) + 30\left(\frac{2.306 + 3.006}{2}\right)$$

$$+ 32\left(\frac{3.006 + 2.714}{2}\right) + 26\left(\frac{2.714 + 2.121}{2}\right) + 28\left(\frac{2.121 + 1.477}{2}\right)$$

$$+ 26\left(\frac{1.477 + 1.043}{2}\right) + 32\left(\frac{1.043 + 0.595}{2}\right) + 26\left(\frac{0.595 + 0.302}{2}\right)$$

$$+ 28\left(\frac{0.302 + 0.216}{2}\right) + (14 \times 0.216)$$

$$= 463.94 \text{ kg}$$

The average percentage of SNF (s) in the milk is:

$$f = \frac{463.94 \times 100}{4974} = 9.32 \text{ percent}$$

B-2.4 Protein

The total mass of protein (P) produced during the lactation is:

$$P = 14 \times 0.931 + 28\left(\frac{0.931 + 0.868}{2}\right) + 30\left(\frac{0.868 + 0.851}{2}\right)$$

$$+ 32\left(\frac{0.851 + 0.696}{2}\right) + 26\left(\frac{0.696 + 0.667}{2}\right) + 28\left(\frac{0.667 + 0.676}{2}\right)$$

$$+ 26\left(\frac{0.676 + 0.422}{2}\right) + 32\left(\frac{0.422 + 0.355}{2}\right) + 26\left(\frac{0.355 + 0.220}{2}\right)$$

$$+ 28\left(\frac{0.220 + 0.150}{2}\right) + (14 \times 0.150)$$

$$= 166.75 \text{ kg}$$

The average percentage of protein (p) in the milk is:

$$p = \frac{166.75 \times 100}{4\,974} = 3.35 \text{ percent}$$

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Animal Husbandry and Equipment Sectional Committee, FAD 32

Organization	*Representative(s)*
Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu, Jammu	DR BHUPENDRA NATH TRIPATHI **(*Chairperson*)**
All India Poultry Breeders Association, New Delhi	DR A. K. RAJPUT DR R. K. JAISWAL (*Alternate*)
Animal Welfare Board of India, Faridabad	MS PRACHI JAIN DR DEBALINA MITRA (*Alternate*)
Bihar Animal Sciences University, Patna	DR DEEP NARAYAN SINGH DR RANJANA SINHA (*Alternate*)
Dau Shri Vasudev Chandrakar Kamdhenu Vishwavidyalaya, Anjora	DR DHIRENDRA BHOSLE DR O. P. DINANI (*Alternate*)
Department of Animal Husbandry and Dairying, Panchkula	DR BIRENDER SINGH LAURA DR DHARMVIR (*Alternate*)
Federation of Indian Animal Protection Organizations, New Delhi	DR SIRJANA NIJJAR DR DINESH MOHITE (*Alternate*)
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana	DR NAVDEEP SINGH DR SIKH TEJINDER SINGH (*Alternate*)
ICAR - Central Avian Research Centre, Bareilly	DR JAGBIR SINGH TYAGI DR JAIDEEP ROKADE (*Alternate*)
ICAR - Central Institute for Research on Buffaloes, Hisar	DR R. K. SHARMA DR SUSHIL KUMAR PHULIA (*Alternate*)
ICAR - Central Sheep and Wool Research Centre, Avikanagar	DR RANDHIR SINGH BHATT DR SROBANA SARKAR (*Alternate*)
ICAR - Directorate of Poultry Research, Hyderabad	DR SANTOSH HAUNSHI DR M. NIRANJAN (*Alternate*)
ICAR - Indian Veterinary Research Institute, Bareily	DR SUBRATA KUMAR GHOSH DR AMIT KUMAR (*Alternate*)
ICAR - National Research Centre on Equines, Hisar	DR S. C. MEHTA DR THIRUMALA RAO TALLURI (*Alternate*)
ICAR - National Research Centre on Pig, Guwahati	DR R. THOMAS DR SUNIL KUMAR (*Alternate*)
Indian Poultry Equipment Manufacturers Association, Hyderabad	SHRI HARISH RAJARAM GARWARE SHRI ANIL SOMNATH DHUMAL (*Alternate*)
National Dairy Development Board, Anand	DR R. O. GUPTA DR A. V. HARIKUMAR (*Alternate*)
National Dairy Research Institute, Karnal	DR ARUN KUMAR MISRA DR SURENDER SINGH LATHWAL (*Alternate*)
National Egg Coordination Committee, New Delhi	SHRI AJIT SINGHD SHRI BHAGWATI SINGH (*Alternate*)
National Institute of Animal Nutrition and Physiology, Bengaluru	DR RAVI KIRAN G. DR RAMACHANDRAN (*Alternate*)

Organization	*Representative(s)*
PETA India, Mumbai	DR KIRAN AHUJA MS FARHAT U. I. AIN (*Alternate*)
People for Animals, New Delhi	MS GAURI MAULEKHI MS SHREYA PAROPKARI (*Alternate*)
Poultry Federation of India, Sonipat	SHRI RANPAL DHANDA SHRI RAHUL KHATRI (*Alternate*)
Tamil Nadu Veterinary and Animal Sciences University, Chennai	DR S. MEENAKSHI SUNDARAM DR M. R. SRINIVASAN (*Alternate*)
Uttar Pradesh Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan University (DUVASU), Mathura	DR YAJUVENDRA SINGH DR MUNEENDRA KUMAR (*Alternate*)
BIS Directorate General	SHRIMATI SUNEETI TOTEJA, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (FOOD AND AGRICULTURE) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI PRADEEP SHARMA
SCIENTIST 'B'/ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE), BIS

Panel on Expert Panel for Review of Standards on Animal Husbandry Equipment Panel, FAD 32 : P2

Organization	*Representative(s)*
ICAR - Indian Veterinary Research Institute, Bareily	DR SUBRATA KUMAR GHOSH **(*Convener*)**
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana	DR NAVDEEP SINGH
National Dairy Development Board, Anand	DR R. O. GUPTA
Tamil Nadu Veterinary and Animal Sciences University, Chennai	DR S. MEENAKSHI SUNDARAM

(*Continued from second cover*)

The composition of the Committee responsible for the revision of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 { 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 { 2367 0012 2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 { 265 9930

Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 { 2254 1442 2254 1216

Western : 5th Floor/MTNL CETTM Technology Street, Hiranandani Gardens, Powai, Mumbai - 400076 { 25700030 25702715

Branches : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.

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