

मवेशियों का दूध दर्ज करने की पद्धति

( पहला पुनरीक्षण )

Method of Milk Recording of Cattle

( First Revision )

ICS 65.020.30

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## 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:

<i>IS No.</i>	<i>Title</i>
IS 1224 (Part 1) : 1977	Determination of fat by the Gerber method: Part 1 Milk ( <i>first revision</i> )
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 ( <i>first revision</i> )

**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

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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 5<sup>th</sup> day and after 25<sup>th</sup> 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 BUTTERFAT, SNF AND PROTEIN**

**A-1 TEST INTERVAL METHOD**

Let,

$M_1, M_2, \dots, M_n$  be the masses, in kilograms, given to one decimal place, of milk weighed in 24 h testings  $C_1, C_2, \dots, C_n$ ;

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

$I_1, I_2, \dots, I_{n-1}$ , the intervals in days between testings  $C_1$  and  $C_2, C_2$  and  $C_3, \dots, C_{n-1}$ , 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:

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

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

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

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:

$$\begin{aligned}
 M &= (14 \times 28.2) + 28 \left( \frac{28.2 + 24.8}{2} \right) + 30 \left( \frac{24.8 + 26.6}{2} \right) \\
 &+ 32 \left( \frac{26.2 + 23.2}{2} \right) + 26 \left( \frac{23.2 + 20.2}{2} \right) + 28 \left( \frac{20.2 + 17.8}{2} \right) \\
 &+ 26 \left( \frac{17.8 + 13.2}{2} \right) + 32 \left( \frac{13.2 + 9.6}{2} \right) + 26 \left( \frac{9.6 + 5.8}{2} \right) \\
 &+ 28 \left( \frac{5.8 + 4.4}{2} \right) + (14 \times 4.4) \\
 &= 4\,974 \text{ kg}
 \end{aligned}$$

## B-2.2 Butterfat

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

$$\begin{aligned}
 B &= 14 \times 1.029 + 28 \left( \frac{1.029 + 0.856}{2} \right) + 30 \left( \frac{0.856 + 0.904}{2} \right) \\
 &+ 32 \left( \frac{0.904 + 0.824}{2} \right) + 26 \left( \frac{0.824 + 0.778}{2} \right) + 28 \left( \frac{0.778 + 0.721}{2} \right) \\
 &+ 26 \left( \frac{0.721 + 0.587}{2} \right) + 32 \left( \frac{0.587 + 0.446}{2} \right) + \left( \frac{0.446 + 0.287}{2} \right)
 \end{aligned}$$

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

$$= 190 \text{ kg}$$

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

$$b = \frac{190 \times 100}{4974} = 3.82 \text{ percent}$$

### 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:

$$p = \frac{166.75 \times 100}{4974} = 3.35 \text{ percent}$$



## ANNEX C

*(Foreword)*

## COMMITTEE COMPOSITION

Animal Husbandry and Equipment Sectional Committee, FAD 32

<i>Organization</i>	<i>Representative(s)</i>
Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu, Jammu	DR BHUPENDRA NATH TRIPATHI ( <i>Chairperson</i> )
All India Poultry Breeders Association, New Delhi	DR A. K. RAJPUT DR R. K. JAISWAL ( <i>Alternate</i> )
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ICAR - Indian Veterinary Research Institute, Bareilly	DR SUBRATA KUMAR GHOSH DR AMIT KUMAR ( <i>Alternate</i> )
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*(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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