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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No. 1413 Press / Mis.

Dated 17-7- 1870.

Not to be folded or roughly handled

Weights and measures.

No. 127

CHIEF SECRETARY
29 JAN 90
GOVERNMENT OF MADRAS

FROM

A. P. MACDONNELL, ESQ., C.S.I.,
Secretary to the Government of India.

To The Chief Secretary to the Government of Madras

GOVT OF MADRAS
30 JAN 90
REVENUE DEPARTMENT

Home Department.
Public.

Calcutta, the 23 January 1890.

SIR,

BY section 8, Act XXXI of 1871, the Governor General in Council is practically empowered to introduce any system of weights and measures of capacity consistent with the statutory unit prescribed by section 3. But although the Act has been on the statute book for more than eighteen years, and the question of prescribing a uniform system of weights and measures has received consideration at various times since its enactment, no notifications have as yet been issued under it.

2. I am now directed to forward for the consideration of His Excellency the Governor in Council a copy of a letter,* with enclosures, received on the subject from the Government of Bombay, and to ask that the Governor General in Council may be favoured with the advice of His Excellency in Council in the matter. The primary standard of weight prescribed by section 2 of Act XXXI of 1871 is a ser of 2·205 lbs., but this is not the ser which is recognized on the railway systems in India, and different measures of weight are believed to be in use in different parts of almost every province in India. The first point upon which the Government of India would be glad to receive information relates to the different measures of weight and capacity in use in the Madras Presidency and the extent to which they are respectively used. The Governor General in Council is fully alive to the difficulties in the way of the adoption by the people of the country of a new system of measures of weight and capacity, and His Excellency in Council is averse to their being compelled to adopt any system unsuited to their methods of business and likely to be disliked by them. At the same time His Excellency in Council is satisfied that the existence of varying weights and measures in different parts of the country, and especially in neighbouring portions of the same province, produces much inconvenience, and is even prejudicial to fair dealing. It appears to him that the development of railway enterprize and the advance of municipal and trade organizations may have removed many of the objections that were formerly felt to the introduction of a uniform system, and he is convinced of the advantage that would result from the introduction of a general system which would be acceptable to the public generally. As at present advised His Excellency in Council is of opinion that the system which promises the best solution of the question is that of the tolah of 180 grains, the ser of 80 tolahs, and the maund of 40 sers. The rupee is exactly the tolah of 180 grains and is already, it is believed, largely used as a standard of weight sufficiently accurate for purposes of every day life. The ser (2·057 lbs.) of 80 tolahs and the maund of 40 sers have already been adopted on the railways in India, and the tendency of trade would naturally be to

* No. 2614, dated the 3rd July 1889.

follow these weights, which would therefore probably be more easily adopted for general use than any others. The convenience of the public generally is the first consideration to which the Government of India has to look in the matter, and it would be far easier to make the use of the simple and familiar system mentioned above general than to introduce a novel system because it has been found suitable in Europe or for the sake of theoretical perfection. But before coming to any conclusion on the point, the Government of India would be glad to receive an expression of the opinion of His Excellency the Governor in Council ——— as to the best system of weights and measures capable of being generally adopted throughout the Madras Presidency, and as to the steps, if any, besides those indicated in section 8 of the Act, which may be taken to promote its general application.

I am to ask that the views of the principal trading associations and communities, European and Native, in the Madras Presidency —— may be invited to aid His Excellency - in coming to a decision on the points raised in this letter.

I have the honour to be,

SIR,

Your most obedient Servant,

A. P. MacDonnell

Secretary to the Government of India.

No. 2614, dated Bombay Castle, the 3rd July 1889.

From—J. NUGENT, Esq., C.S., Chief Secretary to the Government of Bombay, General Department.

To—The Secretary to the Government of India, Home Department.

In 1887 Mr. W. P. Symonds, C.S., then Acting as Director of Land Records and Agriculture, recommended that uniform measures of weight and capacity should be adopted in the various districts of this Presidency, and that all táluka and mahál offices should be supplied with the measures from the Mint, and the District Magistrates should be directed to issue a proclamation calling attention to the fact that all persons using, making or selling measures that did not correspond in capacity and aperture with the standard measures would be liable to prosecution under Chapter XIII of the Penal Code. The weights and measures recommended for universal adoption were as noted in the margin.

Weights.

* 180 Grains (English) make	.	1 tolá.
80 Tolás	.	1 ser.
40 Sers	.	1 khandi.

Liquid measure.

Measure containing 1 ser of water is 1 liquid ser.
Its capacity is 57·0392 cubic inches.

Dry measure.

Measure containing 1 ser of grain is		1 dry ser.
4 Sers make	.	1 páili.
10 Páilis	.	1 dry maund.
20 Maunds	.	1 dry khandi.

2. Mr. Symonds' proposals were circulated to the Commissioners of Divisions, the Commissioner in Sind, all Collectors in the Presidency, the Municipal Commissioner for the City of Bombay, the Commissioner of Police, Bombay, and the Chambers of Commerce, Bombay and Karáchi, for favour of their opinion.

3. The Commissioner in Sind, the Commissioners, Northern Division and Central Division, all the Collectors, with the exception of the Collector of Ahmedabad, and the Commissioner of Police, Bombay, approve of the suggestions made by Mr. Symonds. The Collector of Ahmedabad does not recommend any change, but considers that Government should wait until the decimal system is adopted in Great Britain and then introduce that system into India. The Municipal Commissioner for the City of Bombay agrees with Mr. Symonds in his recommendations as regards the measure of capacity, but, as regards the measures of weight, he suggests that the English pound and ounce should be introduced as much as possible. The Chamber of Commerce, Karáchi, the Collector of Bijápur and the Commissioner, Southern Division, also recommend the adoption of the English system of weights and measures. The Chamber of Commerce, Bombay, considers that any movement of the kind to be serviceable should be universal throughout the country. The Commissioner, Southern Division, holds the same opinion, and strongly recommends that endeavours should be made to establish one standard of weights and measures by applying the English system in its entirety to the whole of British India.

4. His Excellency the Governor in Council considers that the subject is one of considerable practical importance, calling for early treatment on the principle already adopted by the Government of India with regard to the standard measure of length, and I am accordingly directed to forward herewith copies of Mr. Symonds' two letters,* with enclosures, on the subject, with a request that you will be so good as to submit them to the Government of India for their consideration.

* No. 2021, dated 1st November 1887.
No. 258, dated 14th March 1888.

No. 2021, dated Poona, the 1st November 1887.

From—W. P. SYMONDS, Esq., Acting Director, Land Records and Agriculture, Bombay.

To—The Commissioner, Southern Division.

Standard measure of capacity.

With reference to the correspondence ending with Mr. Crawford's letter No. 1871, dated 13th July 1885, I have the honour to address you regarding the questions raised by the Collector of Dhárwár in his letter dated 14th November 1882, in which he pointed out the variations in the capacity ser in use in various parts of the Dhárwár District, and to ask that, if you approve of the proposals which

I have to make, you will forward this letter to Government for such action as may seem desirable.

2. The Collector of Dhárwár says that in 1845 an attempt was made to remove the variations in the ser in use in the district by the introduction of a standard ser of capacity containing 136 rupees' weight of water. In 1848 Government decided (letter dated 18th August) that the standards prescribed in Bengal Regulation VII of 1833 should be observed, *viz.*, the ser of 80 tolás of 180 grains, and the capacity ser containing 80 tolás weight of water. These standards were accordingly introduced in 1849, and, in order to utilize the existing measures, a band or hoop was added to the 136 tolás ser so as to make its capacity 160 tolás weight of water, or twice the prescribed ser. This double ser became the recognized Dhárwár ser. In 1852 standard brass measures, presumably accurate, were supplied by the Military Board, but these are said to be not forthcoming, and the ser with the band or hoop has apparently remained the standard down to the present time, and the discrepancies now complained of are due to it. The band or hoop is not perfectly water-tight, and a doubt seems to have arisen as to whether it was proper to test the measures with water. In 1862 a circular was issued, directing that a mixture of nine sorts of grain should be used in testing the measures. This was apparently an old native plan; but its advantages are not clear, since the kinds and relative quantities of the grains are not prescribed, and there are no data as to the relative weights of any of them. In 1868 Mr. Elphinston tested by means of water the measures kept in the several táluka offices and those in use in the various táluka towns, and from the statement appended to his letter (dated 6th June 1878) it appears that the measure, which should contain 160 tolás of water, contained from 168½ to 180 tolás, the average being about 173, while the quarter measure contained from 40 to 45 tolás. The measures in use follow closely, as a rule, those in the táluka offices. In 1882 Mr. Middleton made a careful and exhaustive examination of the standard measures in the district, and the results are embodied in the memorandum accompanying the letter referred to in paragraph 1 above. The measures were tested by weighing the amount of rice contained, first, by exact or struck measure and, secondly, by heaped measure. The dimensions in inches of the various measures are also stated. The weight of grain in tolás contained by the Dhárwár or double ser varies, according to the locality, from 114 to 141⅛ tolás by exact measure, but the average seems to be about 133. By heaped measure the weight varies from 124 to 152½ tolás, and the average is about 145. Taking the average weights of equal bulks of rice and of water to be as 7 to 9, which is near enough for present purposes, we find the weight of water to vary from 146 to 181 tolás, with an average of about 171. These results do not differ very greatly from the figures given by Mr. Elphinston in 1868, but the two sets of figures do not show variations corresponding to the localities. Mr. Middleton's tests, however, have evidently been taken in a scientific manner, and may be regarded as accurate.

3. I will now analyze the Dhárwár figures more minutely. The four measures tested ought properly, it may be presumed, to contain the following weights of water in tolás :—

Dhárwár or double ser.	Half.	Quarter.	Eighth.
160	80	40	20

The average weight of a bushel of rice may be taken to be 62½lb, while the weight of 8 gallons of water is 80lb. The corresponding weights in rice will, therefore, be—

125	62½	31¼	15⅝

Now, besides the ordinary iron or wooden measures, Mr. Middleton found brass measures at some of the táluka offices, and the weights of the rice held by them are given as follows :—

Gadag	64	32½	15½
Ránebennur	63½	31	
Kod	62½	32½	

These figures show that the brass measures are very nearly correct, and they also show that there is no real difficulty in prescribing a standard. Some of the other measures approximate closely to these, as follows :—

Ránebennur .	126	63⅛	31	I5

(But there is an iron measure here giving)—

78

Hángal, measures marked E I C 1847—

124⅜	63⅛	32	15

and another set, marked the same—

124⅞	64	31¼	15¾

Dhárwár, Huzúr Kacheri measures, made at the factory—

125¼	63¼	31⅛

On the other hand, the other measures at Dhárwár are—

135	66½	33½	17⅛
At Dadag . .	141⅛	69	34¾ 17¼
At Kod . .	114	78	

This 78 measure is marked, like the correct Hángal measures, E I C 1847, and so are the following :—

Kalghatgi . .	136	66½	32½	16½
Karajgi . .	140	68¾	33½	17¼

It is thus clear that the measures marked EIC 1847 vary greatly, and it appears that all the variations in the measures in use in the Dhárwár District are due to the clumsy way in which these standard measures were made. If they were really made by the addition of bands or hoops to old measures, no further explanation is necessary. On the other hand, if the brass measures, which appear to be those supplied by the Military Board in 1852, had been retained exclusively as the standards, the variations in the measures in use would have been small. It is remarkable that the natives appear to have adopted at once the prescribed standards, and the variations in the measures may be said to be wholly due to the action of the authorities prescribing new standards without taking steps to provide accurate measures and to see that the local measures did not deviate from the standards laid down. It is obviously now the duty of the authorities to remedy this state of things by supplying correct standard measures to all the táluka offices, and taking steps to see that they are adopted. Mr. Middleton has mentioned in paragraphs 6 and 21 of his memorandum (dated 14th November 1882) the measures which are required, and I will refer to them again presently.

4. Mr. Middleton's report was circulated to the other Collectors in the Southern Division, and it will be useful to notice the state of the measures as reported to exist in the other districts. The measures have been tested with a mixture of nine sorts of grain. There are no data for determining the specific gravity of such a mixture, but it may be assumed to be a little heavier than the rice used at Dhárwár. If the weight of the water contained by the correct standard measures be represented in tolás as before—

160	80	40	20

then the corresponding weights of the mixture of grain may be assumed to be about—

128	64	32	16

From Ratnágiri the following figures are reported. The figures for the double ser have been obtained by dividing by 2 those given for the páili. The pound has been taken as 39 tolás :—

128	63¾	31¾	15½

The figures are for Vengurla, the first in the statement. The copper measures tested at nine stations vary from—

125	63¼	32⅜	16½

at Khed to—

128½	63¼	32¼	16½

at Málvan. At Ratnágiri the ser rises to—

65¼

The wooden measures at Chiplún and Guhágar give the following results :—

110	66½
110¼	63¼

The figures for this district show clearly that new standard measures, the same as at Dhárwár, are much needed, and that their introduction will occasion little or no derangement of local custom.

5. In the Bijápur District the figures are as follows, taking first the tálukas north of the Krishna :—

Bágevádi .	63½	32⅜	16½	
Muddebihál .	65	31 1/16	16½	
Hungund .	66	32½	17	

These are evidently approximations to the correct standard. These measures were supplied by Government in 1849, but they cannot be considered sufficiently accurate.

At Bijápur, two measures, said to have been received from Sátára in 1854, are as follows :—

62	31½	16

But the Collector says that larger measures are used in the bázár. The necessity for supplying accurate standard measures, as recommedded for Dhárwár, is clearly shewn.

6. In the tálukas south of the Krishna different measures occur. These appear to be similar to the 78-tolá ser which, as has been mentioned, occurs at Ránebennur and Kod in Dhárwár, along with the correct brass measures :—

Bágalkot . .	153	74⅞	36⅜	18¼
Bádámi . .	154½	74 15/16	36 15/16	19⅜
Hungund .	156½	79½	37½	17½

7. These figures are also similar to those reported from the Belgaum District, which are as follows :—

78	38½	18½

The maxima and minima reported from Belgaum are—

78½	39	19½
77	37½	18

There is also a smaller measure of 9½.

The variations in the Belgaum ser are thus small, but the smaller measures do not correspond properly with the larger measures. It would be very advantageous to assimilate the measures to those in the surrounding districts, and this can only be done by supplying the standard measures recommended for Dhárwár. The present Belgaum ser would then be reduced by about one-fifth. It is probable that the Native States in the Southern Marátha Country would also consent to adopt the standards. The readiness with which the standards prescribed by the authorities have always been adopted by the Native community is very noticeable, and as the existing measures have their origin in the action of the authorities, it is clearly our duty to take steps to remove the existing discrepancies. The ser, which contains 78 tolás of grain, probably arose out of the order of Government in 1848 that the ser should contain 80 tolás of water, supplemented by a local order that the ser should contain 80 tolás of a particular mixture of grains, instead of water. The resulting measure is obviously too inexact to be accepted as a standard, and the only course is to substitute a ser of definite capacity. It is useless to tell the people how to test their own measures. Local measures can only be tested by comparing them with authoritative standards, and the first thing necessary is obviously to ensure the correctness of these standards.

8. I regret that there are no figures for Kánara before me.

9. With the view of removing variations in local measures it has been proposed to introduce the Act referred to in these papers as Sir John Strachey's Act, *i. e.*, Act XXXI of 1871. This Act prescribes as the units of weight and capacity respectively, calling both a ser, the kilogramme and the litre. The latter contains between 85 and 86 tolás of water. The adoption of this Act has been several times recommended, but Government have declined to move in the matter (Government Resolutions Nos. 2125, dated 13th July 1878, and 674, dated 17th March 1879). No one who has studied the subject will, I think, again ask for this Act. It has practically remained a dead letter since the adoption, by the railway companies, of the maund of 40 sers of 80 tolás; and, however convenient the metrical system may be for scientific purposes, its inconvenience for purposes of every-day life and the impossibility of adapting it to the measures in use, have effectually prevented its extension in this country as well as in England, where the system was legalized a few years before (27 and 28 Vict., Cap. 117). The length adopted for the metre has been found to be purely arbitrary and incommensurable with any previously known length, and the divisions by tenths is insufficient. Local measures are often those which the experience of many years has shown to be most useful in practice, and any reform in these matters must, in order to be successful, take fully into account whatever merit there may be in existing practices.

10. It has been proposed that the sale of grain by weight, instead of by measure, should be made compulsory. This was suggested in 1875 by the Traffic Manager of the Bombay Port Trust Bandars, and in 1885 it was resolved to make an attempt to introduce this reform into the Central Provinces, on the basis of the railway freight tariff of the maund of 80 sers. For wholesale transactions, when grain has arrived at the stage of enclosure in sacks, sale by weight is of course more exact, and will always find favour without need of official encouragement; but when a small quantity of grain is wanted out of a store in a grain-dealer's shop, or when grain is on a threshing floor, or loose in the hold of a ship, then measurement will always be resorted to, simply because it is handier, and to make weighing compulsory on such occasions would be neither desirable nor feasible. The weight of a given bulk of grain will always be an uncertain quantity, but this does not matter in the least so long as the measures used are of standard capacity. On certain occasions people want a certain bulk of grain, irrespective of its weight, and they have a right to get it.

11. It has also been suggested that struck measures should be made compulsory. Here again there is no reason for interfering with custom. The people think the heaped measure safer, because they see the grain poured from a height and heaped up as much as possible; whereas in striking off the top the measurer may make a hollow in the grain and defraud the purchaser. If the measures are properly made, the weight by heaped measure will be in a very nearly constant ratio to that by exact measure. The diameter of the apertures of the measures must vary as cube roots of the cubical contents.

12. Act XXXI of 1871 is still the only Act relating to weights and measures in this country; and as the Act has not been, and probably never will be, put in force, a difficulty has arisen in the taking of any action by Government with a view to the removal of local variations. It appears, however, that section 20 of Rugulation XII of 1827, Chapter XIII of the Penal Code, and section 153* of the Criminal Procedure Code give sufficient powers for preventing the use of false weights and measures (Legal Remembrancer's letter dated 28th February 1881, in preamble of Government Resolution (General) No. 784, dated 7th March 1881). But the

* (381 in 1881.)

provisions of the Penal Code cannot be enforced unless standard measures are kept by the Magistrates. The Commissioner in Sind observed in 1878 that it was not merely impolitic, but illegal, not to keep standard measures (letter in preamble of Government Resolution (General) No. 2125, dated the 13th July 1878). That false measures should be kept in Government offices, as in Dhárwár, and that the people should thereby be abetted in fraud, the provisions of the Penal Code made wholly inoperative, and confidence in commercial transactions much weakened, in direct consequence of the action taken by the Government authorities, is a state of things calling for urgent and immediate reform.

13. The reform needed is the supply of accurate measures of the four sizes mentioned by the Collector of Dhárwár, to be made in brass at the Mint, to all the táluka and mahál offices, and the issue of a proclamation by the District Magistrate calling attention to the fact that all persons using, making, or selling measures that do not correspond in capacity and aperture with the standard measures are liable to be proceeded against under Chapter XIII of the Penal Code. To encourage the making and keeping of correct measures, persons might be allowed to have their measures stamped with a Government stamp at the kacheri on payment of a fee of one anna. This cannot at present be made compulsory, but Government have decided that there is no objection to the system being maintained optionally (Government Resolution (General) No. 1675, dated 7th May 1885, and previous Resolutions). Measures are probably manufactured at a few places only, and the makers would be glad to pay an anna for a Government stamp, which would enhance by several annas the value of a measure. Steel types for stamping might be supplied from the Mint, as was done on a previous occasion (Government Resolution (General) No. 3607, dated 29th October 1881). The stamp might be—V. I., 1888.

14. It is essential that the standard measure to be kept in Government offices should be supplied from the Mint, and that no attempt should be made to procure them locally. Their preparation will involve some intricate measurements. Mr. Middleton in paragraph 6 of his memorandum (dated 14th November 1882) has given the dimensions of the three brass measures supplied by the Military Board in 1852, and the figures appear to be correct. A fourth measure should also be supplied, as mentioned in Mr. Middleton's paragraph 21, but for the reasons given at the end of paragraph 11 above, it is essential that the depth and diameter should be equal. The required measures are thus as follows :—

(*Note.*—27.7274 cubic inches of pure water at 62° Fahr., Barometer 30 in., weigh 1lb. av.)

Denomination.	Contents in cubic inches.	Height and diameter in inches.
1. Double ser holding 160 tolás of water	114·0784	5·2566
2. Ser holding 80 tolás water	57·0392	4·1721
3. Half ser holding 40 tolás water	28·5196	3·31114
4. Quarter ser holding 20 tolás water	14·2598	2·6283

15. A complete set of these standard measures should be supplied to each táluka and mahál office in the Southern Division. When local measures are compared with them, water should not be used, but any kind of grain common in the locality should be taken; and the amounts held by the standard and by the local measure, first by struck and second by heaped measure, should be weighed against one another. If the results of both weighings agree, the local measure is correct. No testing by water should be attempted locally: this operation can only be done properly at the Mint. But a record should be kept of the weight of each kind of locally grown grain which the measures contain both by exact and by heaped measure.

16. Of the four measures No. 1 is the Dhárwár ser, Nos. 2 and 4 are together very nearly equal to the present Belgaum ser, Nos. 2 and 3 would together nearly represent the Poona ser, and Nos. 3 and 4 would together represent the capacity ser of Bombay. These standards might thus be introduced universally, whether the ser be considered to be always of the capacity of 80 tolás of water or not. The district Collectors and the Chambers of Commerce might perhaps be consulted regarding the assimilation of the standards. It is scarcely necessary to refer to the great advantages of introducing an uniform standard throughout the Presidency and the capacity ser of 80 tolás of water, like the weight ser of 80 tolás, is unquestionably the most convenient, as it is the best known and most widely spread, of all the standards that have been suggested. It has another advantage, that of simple comparison with the English bushel, already referred to in paragraph 3 above. A ser of grain will weigh exactly the same number of tolás as a bushel of the same grain will weigh pounds.

APPENDIX.

Scale of Weights as adopted by Railway Companies.

180 grains make 1 tolá.
80 tolás „ 1 ser.
40 sers „ 1 maund.
20 maunds „ 1 candy.

NOTE.—The lb. avoirdupois is 7,000 grains, or 38⅔ tolás. Therefore the maund is 82⅔ lbs.

Capacity measures recommended for universal adoption—

(NOTE.—The standard weight of water is—an Imperial gallon weighs 10 lbs.)

Measure containing—

1 ser of water is 1 capacity ser.
4 capacity sers make 1 páili.
12 páilis „ 1 maund (capacity).
20 maunds „ 1 candy (capacity).

NOTE.—For the capacity maund to be equal to the weight maund, a capacity ser of the commodity weighed will weigh 66⅔ tolás, which is about the average weight of a heaped ser of grain.

W. P. SYMONDS,

Acting Director, Land Records and Agriculture, Bombay.

No. 4280, dated Dhárwár, the 14th November 1882.

From—J. R. MIDDLETON, Esq., Acting Collector of Dhárwár.

To—The Commissioner, Southern Division.

Standard measures of capacity—Diversity of.

The diversity between the standard measures of capacity kept in the different offices in this district having been brought to my notice, I have had all the measures brought in and tested in my presence. I append a memorandum showing the results of my enquiries, and I trust that you will press upon Government the importance of supplying a set of accurate and reliable measures to each of the Mámlatdár's and Mahálkari's offices as well as to this office. The benefit to the public will more than compensate for the cost.

At present prosecutions for using false measures break down, because there are no reliable measures, and I am not even certain that the standard measures which were made in 1874 and are now in this office are quite accurate. If the law cannot be enforced to prevent the use of inaccurate measures, all uniformity will be at an end.

Memorandum regarding the standard measure of capacity for grain in Dhárwár District.

1. Read correspondence in the file "Weights and Measures, 1825—1853."

2. In 1845 a standard measure, equal to 136 tolás weight of pure water, was introduced.

3. In 1849 the Bengal ser measure, equal in capacity to the bulk of 80 tolás weight of water, was introduced as the standard.

4. This measure being smaller than the 136-tolá measure introduced in 1845 A.D., a hoop was added to the latter to make its capacity equal to 160 tolás weight of water, or double the authorized standard, and this double ser became known as the Dhárwár ser.

5. The Bengal ser, equal in capacity to 80 tolás of water, having been introduced into various districts, Government in 1852 supplied standard measures to the Collector of Dhárwár, and probably to the Collectors of other districts, in which the same standard had been adopted in order to ensure accuracy and uniformity.

6. The measures which were supplied were—

	Contents in cubic inches.	Height and diameter.
A ser measure holding 80 tolás weight of distilled water .	57·0392	4·1721
A half ser measure holding 40 tolás weight . . .	28·5196	31·114
A quarter ser measure holding 20 tolás weight . .	14·2598	2·6283

The diameter of each measure was equal to its height. These measures are not in this office, and it is not known what became of them.

25

7. Before these measures were supplied by Government, the standard had been introduced into the district, and measures had been made to hold 160 tolás weight of water (the Dhárwár ser) or 80 tolás (the Bengal ser). The measures cannot have been made with any accuracy. Distilled water could not be got; the temperature at which it was to be weighed does not appear even to have been prescribed, and what was of far greater importance, the shape of the measures was not specified. There is nothing on record to show that the measures kept as standards in the táluka kacheris were tested by comparison with those received from Government.

8. The standard measure was determined by the weight of water it held, but in measuring grain, heaped measure always is and always has been used. Two measures of different shape might hold equal quantities of water, but different quantities of grain by heaped measure and *vice versá*.

9. In 1861 and 1862 it was brought to notice that the measures in use varied in capacity, and that measures holding equal quantities of water did not hold equal quantities of grain by heaped measure. It was also found to be impossible to test measures by weighing the water they contained, because many of them were not water-tight. This can easily be understood when it is remembered that measures to contain 160 tolás had been made by adding a hoop to the top of the old measures containing 136 tolás. An order was then given that grain might be used in testing them. The old Native standard was a measure which would contain a certain weight of a mixture of 9 different sorts of grain, and this standard was retained in Belgaum where the opposition to the introduction of the standard determined by the weight of water was so strong that it was abandoned. When the order, therefore, was given that grain might be used in testing the measures, a misunderstanding appears to have arisen that the standard Dhárwár ser should contain 160 tolás weight of mixed grain. The correspondence on the subject is all in the vernacular, and is not very clear, but no order was given that the standard measure should contain a certain weight of grain. The intention apparently was to allow measures to be tested by seeing whether they held the same quantity of grain which the so-called standard measures in the táluka kacheris held.

10. In 1865 a question having arisen as to what should be considered to be the standard ser in determining the compensation to be paid to sepoys when prices of grain were high, Mr. Reid directed that a measure which held 80 tolás weight of "Shejji" grain by exact and not by heaped measure should be adopted.

This order was given for a special purpose, but it must have tended to strengthen the supposition that the standard of measure was determined by the weight of grain and not by the weight of water.

11. Although there is general uncertainty on the subject it is clear that the standard determined by the weight of water and introduced in 1849 has never been altered, but heaped measure instead of exact measure has always been used for grain.

12. In 1874, a set of brass measures was made at the Dhárwár Factory. They were made in accordance with verbal orders, and there is nothing on record regarding them except that they were paid for. These measures, namely, a Dhárwár ser, a half ser and a quarter ser, are now in this office. I have no instruments sufficiently accurate to measure decimals of an inch, but from a rough measurement it appears that the half ser is the same as the Bengal ser mentioned in paragraph 3, the Dhárwár ser is double of it, and the quarter ser is the same as the Bengal half ser.

13. I recently made enquiries as to what standards were kept in the tálukas. Some of the Mámlatdárs reported that the standard measures contained certain weights of water, while others said they were determined by the weight of grain. As great uncertainty prevailed, I sent for all the standard measures in the táluka and petha kacheris and have tested them.

14. These so-called standard measures are very roughly made, and consequently cannot pretend to be accurate. Some are not water-right. In many of them the diameter is not the same throughout. The lips are irregular in form, and different measurements of the one measure give different results. I have no instruments for measuring small dimensions with great accuracy, but I have taken the depth and diameter of each measure as carefully as I could. I have also tested the capacity of all the measures by weighing the grain which they hold by exact measure and the Dhárwár sers by heaped measure. For this purpose I used a small quantity of rice, and as the measures were tested with the same grain the result may be taken as showing with fair accuracy the comparative capacities. These results, together with the height and diameter of each measure, are shown in the appended statement. The irregularity in shape explains why a measure, which, according to the dimensions given ought, to contain more, sometimes in reality holds less, than another. In some tálukas there are more than one set of standard measures.

15. Some of the measures are stamped EIC 1847×. These must have been made before 1849 when the present standard was introduced, but they must have been altered as described in paragraph 4, although the date on the stamp was not corrected.

16. Although the East India Company was dissolved long ago it is still the custom to stamp the letters EIC× as the Government mark on measures which are brought to the kacheris to be tested. Some other mark should be prescribed.

17. The appended statement shows the difference between the standard measures in different tálukas. These are the measures by which traders get their measures regulated and by which measures are tested when a prosecution for using false measures is instituted. The

evils which arise from having standard measures of different capacities are obvious. For instance, the Hángal trader, who has got a Dhárwár ser measure tested at Hángal Kacheri and holding 137 tolás weight of grain by heaped measure, runs the risk of being punished for using too small a measure if he uses it in selling grain in the adjoining táluka of Karajgi, where the standard holds 151½ tolás weight, while he may be punished for using too large a measure if he uses it in buying grain in the adjoining táluka of Kod, where the standard holds 124 tolás only.

18. Another evil which arises from the use of heaped measure is that the half ser is not equal to half of the full ser, nor is the quarter ser equal to a quarter. The diameter of the Dhárwár ser measure and of the Dhárwár half ser, *i.e.*, the Bengal ser measure, being the same, the additional quantity obtained by the use of heaped measure is the same for both instead of being double in the one case as compared with the other. The quarter ser is not much used for measuring grain, neither is the half ser or Bengal ser, but they are sometimes used and they are inaccurate. Two halves are not equal to one whole, neither are four quarters.

19. In 1879 Mr. Elphinston urged the adoption of a uniform system of measures of capacity in this district, but Government in their Resolution No. 674, dated 17th March 1879, declined to take any steps in the matter.

20. It would be exceedingly difficult to introduce the system of measurement by exact measure instead of by heaped measure, and I do not advocate it. The importance, however, of having a uniform standard (whatever it may be) throughout the district is so great that I would strongly urge upon Government to supply accurate sets of measures from the Mint for this office and for the Mámlatdárs' and Mahálkaris' offices. It is only reasonable that for the public benefit Government should keep a standard set of measures at each of these offices.

21. The measures to be kept should be those specified in paragraph 6, and also a double or Dhárwár ser containing 160 tolás weight of distilled water. Its contents would be 114·0784 cubic inches, its diameter would be 4·1721 inches, and its height would be double the diameter. This is the measure which since 1849 has been recognized as the Dhárwár ser, and it is used with heaped measure as the measure for grain. These measures would be correct for liquids. The use of heaped measure for grain makes them relatively incorrect, but although this is an evil, it is not much felt, because grain is always measured by the Dhárwár or double ser and not by half or quarter sers.

22. The difference between the standard measures in the kacheris is very great, but the difference between the measures in use throughout the district is probably not so great, because measures are chiefly manufactured at Hubli and tested there before being distributed for sale.

Unless reliable standards are provided, the local differences will increase and will become confirmed by custom.

At present the enforcement of the use of the Dhárwár ser specified above for measuring grain would be popular. It is the recognized measure, but the want of reliable standards makes it difficult to obtain a conviction against a man for using false measures.

DHARWAR;
The 14th November 1882.

J. R. MIDDLETON,
Acting Collector.

Statement showing the results of a comparison of the Standard Measures of Capacity in Dhárwár District.

From what office.	Dhárwár or Double Ser.				Bengal or Half Ser.			One-eighth Dhárwár Ser.			Remarks.
	Weight of grain in tolás.		Diameter in inches.	Height in inches.	Weight of grain in tolás by exact measure.	Diameter.	Height.	Weight of grain in tolás by exact measure.	Diameter.	Height.	
	By exact measure.	By heaped measure.									
Huzur Kacheri. Made at Factory.	135¼	136	4¼	8 2/16	63½	4 2/16		31¼	2 5/16	3 3/8	
Dhárwár . . .	135	146½	4 5/16	8	66½	Top 3 13/16, but lower down the diameter is less.		31¼	2 5/16	3 3/8	
Devar, Hubli Petha .	136¼	147	4 5/16 but smaller below.	8 3/8	67	3 3/4		31¼	3	3 3/8	
Hubli . . .	136¼	146¾	4 7/16	8 7/16	68½	3 3/4		32	2 13/16	3 3/8	
Navalgund . . .	129⅜	139½	4 1/16	8 1/4	68⅜	3 3/4		32	3	3 3/8	
Nargund . . .	137	149¾	4 3/16	7 15/16	63¼	4 1/16		32¼	3	3 3/8	
Gadag . . .	141⅛	152½	4 7/16	8 1/16	69	4 3/16		32¾	3 5/16	3 3/8	
Do. brass measures .	...	...	...	...	64	4 3/16		32¾	2 15/16	3 3/8	
Mundurgi Petha . .	139¼	151	4½	8 1/16	66¼	3 13/16		33	3 1/16	3 3/8	
Ránebennur . .	126	134⅜	4 5/16	7 15/16	63 3/8	3 15/16		31	3	3 3/8	
Ditto brass measure .	...	...	...	...	33½	4 1/16		31	2 15/16	3 3/8	
Ditto spare iron measures.	...	...	...	...	78	4 3/8		31	...	...	
Bankápur . . .	137	148¼	4 7/16	8 3/4	67¼	3 13/16		34	2 7/16	3 3/4	
Hángal Stamped E.I.C., 1847	124⅜	135¼	4 1/16	7 11/16	E.I.C., 1847, 63⅜	3 7/16		E.I.C., 1847, 15	2 3/8	3 3/8	
Ditto ditto .	124⅞	137	4½	7 7/16	E.I.C., 1847, 64	3 15/16		E.I.C., 1847, 15¾	2 7/16	3 3/8	

Statement showing the results of a comparison of the Standard Measures of Capacity in Dhárwár District—continued.

From what office.	Dhárwár or double Ser.				Bengal or half Ser.			Quarter Dhárwár Ser.			One-eighth Dhárwár Ser.			Remarks.
	Weight of grain in tolas.		Diameter in inches.	Height in inches.	Weight of grain in Tolas by Exact measure.	Diameter.	Height.	Weight of grain in Tolas by exact measure.	Diameter.	Height.	Weight of grain in Tolas by exact measure.	Diameter.	Height.	
	By exact measure.	By heaped measure.												
Kalghatgi	E.I.C.,1847, 136	146½	4⅜	8⅛	E I.C.,1847, 66½	3 1/16	5 15/16	E.I.C.,1847, 32½	2 15/16	4 3/16	E.I.C.,1847, 16½	2 7/16	3⅝	
Karajgi	E.I.C.,1847, 140	151⅛	4 9/16	8 11/16	E.I.C.,1847, 68¾	3 13/16	6 1/16	E.I.C.,1847, 33½	3	4⅞	E.I.C.,1847, 17¼	2½	3 13/16	
Kod	114	124	4 1/16	8	E.I.C.,1847, 78	4 9/16	4 9/16	Brass measure, E.I.C., date illegible, 32½	2 15/16	4¾	...	...	...	
					E.I.C.,1847, 78	4 9/16	4⅝	..	...	...	...	...	...	
					Brass measure, 62½	4 3/16	4 3/16	...	...	...	...	...	...	
Ron	E.I.C., date illegible, 133⅛	147⅛	4 11/16	7 11/16	E.I.C.,1847 78½	4 7/16	4 11/16	E.I.C.,1847, 31¼	2 15/16	4 11/16	E.I.C.,1847, 15⅝	2 5/16	3⅜	
	E.I.C.,1847, 132¼	144	4⅜	8	E.I.C.,1847 65½	3 13/16	5 7/16	...	..	...	E.I.C.,1847, 16	2 7/16	3 7/16	
	E.I.C.,1847, 132¼	143½	4 7/16	8 3/16	E.I.C.,1847, 66¾	3¾	5¾	...	...	...	Brass, but no stamp, 16⅝	2 11/16	3 3/16	
	E.I.C.,1847, 135	147	4½	8 5/16	No stamp, 66	3 11/16	5⅝	...	...	...	...	...	...	
Savanúr	E.I.C., date illegible, 137⅞	149⅝	4½	9⅛	E.I.C., date illegible, 67⅞	3⅞	6	E.I.C.,date illegible, 32⅛	3 3/16	4⅞	E.I.C., date illegible, 16⅜	2⅜	3 9/16	

Dhárwár Collector's Office;
The 14th November 1852.

J. R. MIDDLETON,
Acting Collector.

Statement showing the results of a comparison of the Standard Measures of Capacity.

From what office.	Dhárwár or Double Ser.				Bengal or Half Ser.			Quarter Dhárwár Ser.			One-eighth Dhárwár Ser.			Remarks.
	Weight of grain in lbs.		Diameter in inches.	Height in inches.	Weight of grain in lbs. by exact measure.	Diameter.	Height.	Weight of grain in lbs. by exact measure.	Diameter.	Height.	Weight of grain in lbs. by exact measure.	Diameter.	Height.	
	By exact measure.	By heaped measure.												
Huzúr Kacheri made at Factory.	3·2115	3·487	4¼	8 9/16	1·6282	4 3/16	4¼	·8076	3 5/16	3⅜	...	...	...	1 lb. = 39 tolás.
Dhárwár	3·4615	3·7564	4 5/16	8	1·7051	Top 3 13/16, but lower down the diameter is less.	6 5/16	·8589	3 1/16	4 11/16	·4391	2 9/16	3⅜	
Devar, Hubli Petha	3·4935	3·7692	4 5/16 but smaller below.	8⅜	1·7179	3¾	5¾	·8782	3	5 1/16	·4102	2¾	2⅜	
Hubli	3·4935	3·7564	4 7/16	8 7/16	1·7564	3¾	6 3/16	·8717	3	4 13/16	·4383	2 7/16	3 5/8	
Navalgund	3·3173	3·5769	4 5/16	8¼	1·7532	3 5/8	5 7/8	·8205	2 13/16	4 7/8	·4198	2½	3½	
Nargund	3·5128	3 8333	4 9/16	7 15/16	1·6217	4 3/16	4⅛	·8269	3⅜	3 5/16	·4166	2⅝	2 11/16	
Gadag	3·6185	3·9102	4 7/16	8 11/16	1·7692	3¾	6 1/16	·8910	3	5	·4423	2½	3 11/16	
Gadag brass measures	...	...	...	...	1·6410	4 5/16	4 3/16	·8333	3 5/16	3⅜	·4198	2 11/16	2 11/16	
Mundargi Petha	3·5705	3·8717	4½	8 11/16	1·6987	3 13/16	5 9/16	·8717	2 15/16	4 15/16	·3878	2⅜	3¼	
Ránebennur	3·2307	3·4455	4 5/16	7 13/16	1.6185	3 9/16	5 9/16	·7948	2 15/16	4 9/16	·3846	2⅜	3 5/16	
Ránebennur brass measures	...	...	...	...	1·6282	4 1/4	4 1/8	·7948	3 5/16	3⅜	...	...	...	
Ránebennur spare iron measures.	...	...	...	...	2 lbs.	4⅜.	4 9/16	...	...	...	...	...	...	
Bankápur	3·5128	3·8076	4 7/16	8¾	1·7307	3 13/16	6	·8716	2 15/16	5 1/16	·4423	2 7/16	3¾	
Hángal Stamped E.I.C., 1847.	3·1891	3·4679	4 11/16	7 11/16	E.I.C.,1847, 1·625	3 9/16	5½	E.I.C.,1847, ·8205	3	4⅝	E.I.C.,1847, ·3846	2⅜	3⅜	
Ditto ditto	3·2019	3·5128	4½	7 7/16	E.I.C.,1847, 1·6410	3 15/16	5⅜	E.I.C.,1847, ·8012	2 13/16	4½	E.I.C.,1847, ·4038	2 7/16	3⅜	

10

11

Statement showing the result of a comparison of the Standard Measures of Capacity—continued.

From what office.	Dhárwár or double Ser.			Bengal or half Ser.			Quarter Dhárwár Ser.			One-eighth Dhárwár Ser.			Remarks.
	Weight of grain in lbs.												
	By exact measure.	By heaped measure.	Diameter in inches.	Height in inches.	Weight of grain in lbs, by exact measure.	Diameter.	Height.	Weight of grain in lbs. by exact measure.	Diameter.	Height.	Weight of grain in lbs. by exact measure.	Diameter.	Height.	
Kalghatgi:	E.I.C.,1847, 3·4871	3·7564	4⅜	8½	E.I.C.,1847, 1·7051	3 11/16	5 11/16	E.I.C.,1847, ·8333	2 1/16	4 3/16	E.I.C.,1847, ·4230	2 7/16	3 5/8	
Karajgi	E.I.C.,1847, 3·5·97	3·875	4 9/16	8 11/16	E.I.C.,1847, 1·7628	3 13/16	6 1/16	E.I.C.,1847, ·8589	3	4 7/8	E.I.C.,1847, ·4423	2 1/2	3 13/16	
Kod	2·9337	3·1794	4 7/16	8	2 lbs.	4	4 7/16	Brass measure, E.I.C., date illegible, ·8333	2 15/16	4 3/4	...	...	...	
					E.I.C.,1847, 2 lbs.	4	4 5/8	...	...	...	...	...	...	
					Brass measure, 1·6025	3 15/16	4 3/16	...	...	...	...	...	...	
Ron	E.IC., date illegible, 3·4134	3·7724	4 11/16	7 11/16	E.I.C.,1847, 2·0128	4 7/16	4 7/16	E.I.C.,1847, ·8012	2 15/16	4 11/16	E.C.I.,1847, ·4006	2 5/16	3 3/8	
	E.I.C.,1847, 3·3910	3·6923	4 3/8	8	E.I.C.,1847, 1·6794	3 11/16	5 7/16	...	...	...	·4102	2 7/16	3 7/16	
	E.I.C.,1847, 3·391	3·6794	4 7/16	8 3/16	E.I.C.,1847, 1·7115	3 13/16	5 3/4	...	...	...	Brass, but no stamp ·4262	2 11/16	3 3/16	
	3·4615	3·7692	4 1/2	8 5/16	1·6923	3 11/16	5 5/8	...	...	...	...	...	...	
Savanúr	E.I.C., date illegible, 3·5352	3·8305	4 1/2	9 1/8	E.I.C., date illegible, 1·7403	3 7/8	6	E.I.C., date illegible, ·8237	3 1/8	4 7/8	E.I.C., date illegible, ·4198	2 3/8	3 3/16	

J. R. MIDDLETON,
Acting Collector.

Dhárwár Collector's Office;
Gadag, 22nd December 1882.

No. 1931, dated Poona, the 1st November 1887.

From—W. P. Symonds, Esq., Acting Director, Land Records and Agriculture, Bombay.

To—The Acting Chief Secretary to the Government of Bombay, General Department.

I have the honour to submit my opinion regarding the question raised in Government Resolution No. 2989, dated 28th September 1887, regarding the weight of the Bombay ser. The point is whether the ser should be one-fortieth of the Bombay maund of 28 lbs. or whether it should be 28 tolás. Now, if the latter be correct, that is, if there be the same number of tolás in the ser as there are pounds in the maund, then there must also be the same number of sers in the maund as there are tolás in the pound. This gives at once the explanation of the discrepancy. The pound has been considered as the pound or 40 tolás, of 7,200 grains, instead of the ordinary Avoirdupois pound of 7,000 grains. The ser has been considered exactly $\frac{1}{40}$ of the maund of 28 pounds of 40 tolás each. In some respects the pound of 40 tolás is more convenient than the Avoirdupois pound, but not in the present case, because 28lbs. Avoirdupois make 1 quarter, or quarter cwt., and the advantages of this exact weight are obvious. The ser should therefore be taken as $\frac{1}{40}$ of 28lbs. Avoirdupois, or 4,900 grains ($27\frac{2}{9}$ tolás). This is the weight of 49 new quarter-anna pieces, I believe.

This maund has evidently been fixed to suit English custom. The native scale was probably something like this—24 tolás (of about 188 grains each) make 1 ser, 48 sers make 1 maund. But the natives will call almost anything a maund. It is a great pity that this weight of 28lbs. Avoirdupois is not called a quarter, which it is, instead of a maund, which it is not. The proper maund for use in Bombay is the Indian maund as used by the Railway Companies, consisting of 40 sers of 80 tolás each. Its exact weight is $82\frac{2}{7}$lbs. Avoirdupois. Either this or the cwt. is the proper standard of weight; similarly, the ser should be the Indian ser of 80 tolás or 14,400 grains. The capacity ser should be a measure of standard dimensions holding a ser of distilled water at 60° Fahr.

I hope that Government will see fit to communicate this letter to the quarters to which the Resolution referred to was addressed, as it may tend towards the elucidation of a subject on which reform is much needed.

No. 885, dated Camp Kedgaon, the 26th November 1887.

From—W. P. Symonds, Esq., Second Assistant Collector, Poona.

To—The Director, Land Records and Agriculture, Poona.

While I was officiating in your appointment I addressed a letter to Government regarding the weight of the Bombay ser. I wish to add a few remarks in connection with the same subject.

2. The scale of weights from which the Bombay maund of 28lbs. has arisen is similar to the scale which is used up-country for weighing precious metals, *i.e.*, gold and silver. It thus corresponds to our Troy scale. Opium is also sold by this scale by licensed vendors, and the scale has thus to a certain extent an official recognition :—

Goldsmith's Weights.

8 gunj, or rati, or raktika	= 1 másha
12 másha (or 40 vál)	= 1 tolá.
24 tolá	= 1 ser.
40 ser	= 1 maund.

If the tolá be taken as a Government standard tolá, *i.e.*, the weight of a rupee, or 180 grains, we have the following :—

1 másha	= 15 grains.
1 goldsmith's ser	= 9 oz. Troy.
1 goldsmith's maund	= 30 lbs. Troy.

In weighing opium, the tolá is taken as the standard tola, but the tolá ordinarily used by the people is heavier, the average weight seems to be 188 grains, and thus the average weight of the Bombay maund was originally about 26lbs. Avoirdupois. This has been increased to 28lbs. to make it equal to the English quarter cwt. There is no reason why the standard tolá of 180 grains should not be universally adopted, and the people would be perfectly willing to adopt it if proper steps were taken. But by making the maund 28lbs. divided into 40 sers and then attempting to divide the resulting ser into an even number of tolás, reform has bee, much impeded. The 28lbs. weight should be divided into 28lbs. For heavy weights thn maund of 40 sers of 80 tolás should be retained, and the goldsmith's weights (másha, tolá, sere and maund) as given above might be recognized.

3. The 40-tolá pound, 35 of which make 36lbs. Avoirdupois, is sometimes used, but its, recognition is not recommended, because it is simpler and less likely to occasion mistakes to call the pound the pound and to call the 40-tolá weight half the Indian ser.

4. In my former letter I pointed out that one-fortieth part of the maund of 28lbs. (the origin of which I had not then ascertained) should be a ser of 4,900 grains. But this ser does not correspond with the native measure and has nothing to recommend it beyond the fact that it is the fortieth part.

No. 2178, dated Poona, the 5th December 1887.

Endorsed by the Director, Land Records and Agriculture.

Submitted to Government in continuation of this office No. 1931, dated 1st ultimo.

No. 258, dated the 14th March 1888.

From—W. P. Symonds, Esq., Second Assistant Collector, Poona.

To—The Secretary to the Government of Bombay.

With reference to Government Resolution No. 322, dated 30th January 1888 (General Department), I have the honour to submit some further remarks regarding the standard ser.

2. My letter to the Commissioner, Southern Division, which was circulated with the above Resolution, was written on consideration of the reports of the Southern Division, which have also been printed, and at that time I had had no opportunity of making experiments in testing measure and weighing grain. I have now gained some further experience, and desire to modify in one particular the proposals made in my former letter, in order that the scheme for an universal standard may be more readily adopted in the various districts of the Presidency. As the Collectors may be now preparing to report in answer to the Resolution, I should be glad if Government would circulate this letter at an early date in continuation of the former papers.

3. The standard ser containing 80 tolás of water I still advocate as the liquid ser. This ser is actually in use in Poona, Ahmednagar, and probably many other places, for measuring liquids, but this fact in itself makes the natives unwilling to adopt the same measure of capacity for dry goods such as grain, because grain is much lighter than water. In order, therefore, that the natives may be readily induced to adopt the standard, I now recommend for the standard of dry measure a ser which contains by exact measure a ser weight of grain of standard weight. The maund of capacity will also be a vessel containing a maund of standard grain.

4. I find that the standard weight of grain is ·8 when water at 62° F. (barometer at 30 inches) is unity. This corresponds to a weight of 64lbs. to the bushel, or 64 tolás to the ser containing 80 tolás of water. Since 64 is to 80 as 80 is to 100, the standard ser I advocate for dry measure will contain 100 tolás of water, and its capacity will be thus one-fourth larger than the liquid ser.

5. Sixty-four, water being 80, is exactly the weight I assumed for the mixture of nine sorts of grain used in testing the measures in the Southern Division (paragraph 4 of the letter to the Commissioner, Southern Division). In some other parts of the Presidency a mixture of five sorts of grain is used. The weight of every sort of grain and of any mixture of course varies very much, and no grain or mixture can be accepted as a standard, unless it be referred to an invariable standard, such as water of known density. But it is easy to show that the standard of weight which the natives aimed at in these mixtures of grain is almost exactly that which I now propose. I have tested a great many samples of grain with the aid of a choudrometer lent me by the Director of Land Records and Agriculture, and this instrument shows the weight of a certain bulk of grain when the same bulk of water weighs 80. The following are average results of experiments taken in the month of February with this season's grain. The grains are those commonly used for the mixtures, and they are mentioned in the order in which they are enumerated at page 101 of the Manual of Revenue Accounts :—

I.—Jovári	61	I.—Bájri	63
Bájri	63	Rice	63
Wheat	63½	Wheat	63½
Sáva	59	II.—Turi	66
II.—Mug	65¼	Harbhara	64½
Udid	67		
Math	68		5) 320
Vátána	65		
Masur	64	Average	64
	9) 576		
Average	64		

Different samples will vary as much as 5 on either side of the averages shown. Cereals (class I) generally weigh less than the average 64, while pulses (class II) weigh above it. The mixtures provide for nearly equal parts of grains above and below.

6. Ten experiments in Poona City with various sorts of grain gave the following results :—Average weight by choudrometer, 64·05 ; average weight of contents of ser by exact measure, 80·2 tolás. This shows that if grain be taken as 64, the Poona City ser contains 80 tolás weight as nearly as can be measured. (The average weight of the heaped ser is 93.)

7. This ser, which is now recommended for adoption, appears to be the same as the ser which I called in my former letter the 78-tolá ser, and which is the ser in use in Belgaum, in Bijápur, south of the Krishna, and in several places in Dhárwár. The 78 tolás probably correspond to 80 tolás of standard grain. At other places in Dhárwár the ser in use is intermediate between this ser and the smaller ser containing 80 tolás of water. The Kanara ser seems to be nearly the same and the *paka* ser in Thána is exactly the same.

8. The Poona City ser is not, however, in use outside the Haveli Táluka of the district. The district ser is an approximation to the Ahmednagar ser. This appears to contain by exact measure 100 tolás weight of standard grain (125 tolás water), and a similar ser is in use in Násik and Sátára, except that a lighter grain has been taken as standard. The Ahmednagar ser is thus one-fourth larger than the ser now recommended. It is in use at Sirur, but in other towns of the Poona District the ser varies between the two sers, so that there are nearly as many sers in this district as there are market towns. I propose that all the sers be cut down to the Poona City ser. This can easily be done so that the measure in use can be utilised. The same course could be followed in the other districts mentioned above, and also in Khándesh and Sholápur where the ser appears to contain 160 tolás of water. From what I have heard while conducting experiments I believe that the people will accept the proposed reforms with the greatest satisfaction and will readily pay an auna for a stamp for every measure tested.

9. In the Appendix I have given details of the measures required. The cubical capacity and aperture being defined, the shape is a matter of indifference and the native hour-glass shape is the most convenient for handling. The relative weights of standard grain and water may easily be remembered in the following way :—A bushel contains 64 pints, therefore *a pint of standard grain weighs one pound Avoirdupois ;* and a pint of water weighs a pound and a quarter. The ser now advocated would be exactly a quart if the pound were exactly 40 tolás.

10. I find that it would be very costly to supply brass standard measures from the Mint to all táluka offices, and that, moreover, the way to use brass measures is not everywhere understood. I would therefore propose that a few complete sets of measures should be made at the Mint and copied in native fashion by native makers under strict supervision. Wooden measures such as commonly used, could then be supplied to all tálukas after being tested and stamped. The most important measures are the double ser, half ser and one-eighth ser. The others might be dispensed with.

11. Four sers make a páili and the number of páilis to the maund is a variable quantity. I have taken the number as 10, in order that the capacity maund may contain a maund weight of standard grain.

12. The cylindrical measures of brass or copper containing 80 tolás of water which exist in many táluka offices will serve as standards of liquid measures. These measures are used for milk in many places. The ser and quarter ser are the measures chiefly used. The cylindrical shape may conveniently be retained for the liquid measures, and the aperture, which is immaterial, may conveniently be much smaller than the depth. The different shape and appearance will prevent confusion between the dry and liquid measures.

13. As regards weights I have nothing further to propose. The goldsmith's ser of 24 tolás had better be abandoned, as we have enough sers without it. The only weight ser required is that of 80 tolás. In Bombay there seem to be seven or eight different sers, but the *paka* ser is nearly 80 tolás and might be assimilated to it. In Poona City the weight ser is 76 tolás, but this may be raised to 80 without difficulty, and if their capacity ser is universally adopted, the Poona people should not object to changing their weight ser. In Sirur, as at Ahmednagar, the 80 tolá ser is in force, and the weights are well regulated. At Sasvad, the weight ser is 76½ tolás—a sort of compromise as in the case of the capacity ser. English weights of 2lbs. Avoirdupois are in use in some places with a hollow scooped in the bottom to reduce the weight. Two lbs. contains 77⅞ tolás, but the standard weight must contain an even number of tolás, and the most convenient and widely-spread number in use is 80.

APPENDIX.

Weights and measures proposed for universal adoption.

[Note.—The standard weight of water is—one pint weighs 1¼ lbs. Avoirdupois, and of grain—one pint weighs 1lb. The pint contains 34·65923 cubic inches.]

Weights.

180 grains (English) make	1 tolá.
80 tolas	1 ser.
40 sers	1 maund.
20 maunds	1 khandi.

[Note.—40 tolás contain 7,200 grains and the lb. Avoirdupois 7,000. The lb. is 38⅜ tolás and the maund 82⅔ lbs.]

Liquid measure.

Measure containing 1 ser of water is 1 liquid ser. Its capacity is 57·0392 cubic inches.

Dry measure.

Measure containing 1 ser of grain is 1 dry ser—

4 sers make	1 páili.
10 páilis	1 dry maund.
20 maunds	1 dry khandi.

[NOTE.—The aperture of each dry measure is that of a cylinder of the same capacity with aperture equal to depth.]

Name of dry measure.	Weight of water contained.	Contents.	Aperture.
	Tolás.	Cubic inches.	Inches.
Maund	4,000	2851·9600	15·3704
Páili	400	285·1960	7·1343
Double ser	200	142·5980	5·6625
Ser	100	71·2990	4·4943
Half ser	50	35·6495	3·56715
Quarter ser	25	17·82475	2·83125
Eighth ser	12½	8·91237	2·24715

Government of India Central Printing Office.—No. 681 H. D.—14-11-89.—40.—W. B. G.

Rev: 85/90

(1890.)

REVENUE DEPARTMENT.

No. 855.

From

The Secy to Govt
Home Dept

ABSTRACT.

Dated 23 January.

Received 30 do.

Enclosures 1

No. 3/127.

SUBJECT.

Forwarding for consideration and favor of advice Corrs respondence on the question of prescribing a uniform system of weights & measures and requesting to be favored with an expression of opinion as to the best system of weights and measures suitable to the Province

From

REVENUE DEPARTMENT.

Current

Dat 23 January 1890

FOR ORDERS.

REVENUE DEPARTMENT.

No.

Dated 18 .

R O RDERS.

I believe the villagers would readily accept it, but I am not sure about the towns

JG

The Hon'ble Member who
has moved, should be placed
his remarks that the
Govt of India had already
opened the question
by circulating the
Resolution in Packet 2.
which was sent the Hon'ble
Mr Jones. The effect
of the legislation and the
existing restrictions must be carefully
considered before
any extension of the
Standard to the sale
of articles necessary
to the supply of stamped
measures to the public.

Ch
12/7

No. 210 dtd 17/3/90

Encls dtd 12/3/90

No. 571

Encl cy No 590

CHIEF SECRETARY'S
17 MAR 90
GOVERNMENT OF MADRAS

HOME DEPARTMENT;

Calcutta, the 12 March 1890.

GOVERNMENT OF MADRAS
21 MAR 90
REVENUE DEPARTMENT

Dear Sir

In continuation of Home Department Circular No. 3—127-139, dated the 23rd January 1890, I am desired to forward for the consideration of His Excellency the Governor in Council the accompanying copy of a Note by Colonel J. C. Ardagh on Weights and Measures in India. This note is not to be made public, but there will be no objection to the nature of the suggestions contained in it being communicated to any local and mercantile bodies without Colonel Ardagh's name being mentioned.

Yours truly
C Ilbert

To

J. Grose Esq. C.S.I.
Offg Chief Secy to Govt.
Madras

Rec'd 17 & R.O. thereto

His Excellency the Viceroy—

In accordance with your Excellency's instructions, I submit a Note upon Weights and Measures in India, which may be useful in the discussion of the question.

WEIGHTS AND MEASURES IN INDIA.

The desirability of establishing an uniform system of weights and measures in India has long been recognised, frequently discussed, and occasionally legislated upon. It is now again brought up for consideration; and as the general subject is one to which I have long devoted attention, and in which I have been practically concerned in reference to the application of it in Egypt, perhaps I may be able to aid in the solution by offering the views of a specialist, tempered by experience of the results which have attended on the efforts of those who have laboured in the same field.

What the specialists have aimed at is the unification of weights and measures throughout the world. In the Continent of Europe, excepting Russia, this has virtually been attained by the adoption of the *Metric system*, which originated in France in 1798, and has been accepted and made compulsory in Germany 1872, Austria 1876, Italy, Spain 1859, Holland 1819, Belgium 1831, Norway, Sweden, Greece 1836, Portugal 1852, Denmark and Switzerland. It has also been formally introduced in Turkey and Egypt, but with a reservation of existing standards; and it was permissively legalised in England in 1864; in India, in respect of weights only, in 1871; and in America in 1866, but in those countries has made little or no progress.

The principal countries standing out of the Metric system are—England, the United States, and Russia. The United States standards are identical with our own, with the addition of a *zentner* or weight of 100lbs., which enters into competition with the hundredweight of 112lbs., and which is largely used in the import corn trade in England. In Russia the unit of length (1 Sagene) is exactly equal to 7 English feet, but the weights and measures of capacity have no common measure with our own.

In the world at large then, the Metric and the British systems are the two great rivals. While freely admitting the superior merits of the former, and anticipating that they will eventually be recognised as sufficiently important to lead to the adoption of the Metric system by both England and America, practical considerations force upon us the conviction that the time has not yet come for such a change to be acceptable to the English-speaking populations of the world, and that our time-honoured and cumbrous weights and measures have yet a long lease of life before them.

The English and the Americans are the great explorers of the world by land and sea, and our maps and charts, constructed on scales of so many *Inches* to a *Mile*, spread over both hemispheres, and are used by all nations. The British *Knot*, or *nautical mile*, of 2,000 yards, is the only measure which is, as far as I can recollect, now universally recognized by the whole civilised world—the Metric enthusiasts having entirely failed to force the decimal notation on astronomers and geographers even in France, the home of the system.

Wherever the Union Jack or the Stars and Stripes fly, there the *Ton* is the standard of maritime freight. Even the Suez Canal Administration, which, until lately, was exclusively French, deals with shipping by the British Ton. The Metric system notwithstanding,—these measures have perforce to be accepted by the rest of the world, and the date of their extinction is indefinitely remote.

Turning now to India in particular, we find that the operations of the Survey Department have settled *Miles* and *Inches* as topographical measures beyond any practical possibility of change;—that the Revenue assessments and statistics have added the *Acre* to the list of accepted British measures;—* that the *Yard* has this year been legalized as the standard of length;—that the Public Works Department makes its contracts in *Yards*, *Feet*, and *Inches*;—that the Railways and Roads reckon their extent by the *Mile*;—that the Irrigation and Forest Departments count their areas in *Acres*;—that the Excise Duties are levied on liquors by the *Gallon*;—that the *Gallon* is employed as a dry measure of capacity in Burma;—that Madras has recently legislated in British weights;—that the Import and Export Returns are given in *Tons*, *Hundredweights*, *Pounds*, *Yards*, and *Gallons*. In short, British weights and measures have already been very largely adopted in India, and have been accepted without a symptom of opposition.

There appears to be but one stumbling-block to their further extension, but it is not of insuperable magnitude.

In 1833 the weight of the *Tola* was fixed at 180 grains Troy, and in 1835 that weight was adopted for the Company's Silver Rupee. The resultant table of weights ordinarily in use consequently worked out as follows:—

TABLE A.

Indian Weights based on the Tola of 180 Grains.

				Grains.		lbs. Troy		lbs. Avoirdupois.
	1	Tola		180	=	1/32	=	
5 Tolas	= 1	Chittack	=	900	=	5/32	=	
16 Chittacks	= 1	Seer	=	14,400	=	2½	=	2·05715
40 Seers	= 1	Maund	=	57,600	=	100	=	82·286

* Note.—The Bigha, in which some settlements have been made, is a measure due to the arbitrary pronouncements of the officers or departments charged with the operation. Its basis, if it has any, appears to be an equivalent in English Inches of the obsolete *gaz*. The Standard Bigha is now exactly 5/8ths of an acre.

The simple relation between the Maund and the Pound Troy has a plausible air of roundness, but is not of the slightest practical utility as there is no easy common measure between the Indian weights and the Avoirdupois scale with which we are alone concerned in commerce. It is no sort of comfort or consolation to the import and export merchant to reflect on the fact that the Maund of this scale exactly equals 100 pounds Troy, as he never has to deal with that obsolete system. What he wants is something easily convertible into the units by which he buys and sells in the largest markets of the world—the Pound and the Ton; the Gallon and the Bushel.

It must be admitted that this fixation of the weight of the Tola was most unfortunate. Had it been made equivalent to 175 grains instead of 180, the foundation would have been laid for establishing a most easy and simple correlation between the Indian and British systems, as will appear from the following table:—

TABLE B.

Proposed Imperial Indian Scale of Weights based on the Tola of 175 Grains.

				Grains.		Avoirdupois. Ounces.		Pounds.
	1	Tola	=	175	=	4/10	=	1/40
5 Tolas	= 1	Chittack	=	875	=	2	=	1/8
16 Chittacks	= 1	Seer	=	14,000	=	32	=	2
40 Seers	= 1	Maund	=				=	80
28 Maunds	= 1	Ton	=				=	2,240

And applying the same scale to Measures of Capacity, we have—

				Pint.		Gallon.		Bushel.
1	Chittack	=		1/10	=	1/80		
10	Chittacks	=		1		1/8		
1	Seer	=				1/5	=	1/10
5	Seers	=	1					
1	Maund	=				8	=	1

This adaptation of Imperial to Indian Weights and Measures leaves little to be desired in point of convenience. The ratios are simple, and suit our own and the Indian names. It is but a slight effort of memory to bear in mind that the Chittack and Seer are the doubles of the Ounce and Pound, and that the Liquid Maund is exactly a Bushel. The change would involve a diminution of 1/36 or under 3 % on the scale based on the Tola of 180 grains. In so far as the Rupee is concerned, the change of weight might be made by reducing the

quantity of alloy from 15 to 10 grains, thus leaving the value constant, increasing the *fineness* from 11/12 to 17/18 and diminishing the weight from 180 grains to 175. This is not, however, essential, but it might be considered in the Mint.

The Postal Department is perhaps that which is most concerned in the weight of the Tola; but the change involved in the postal weights may be provided for by increasing the margin of toleration to 3 per cent. for a certain period.

Inasmuch as the seers and maunds actually in use in the country not only vary in different localities, but even for different articles in the same market, the force which might attach to an argument against changing a standard, in the case of that standard being universally accepted, has little or no place in India where the variations already tolerated far exceed the trivial alteration involved in this simple assimilation with British weights.

It should also be borne in mind that measures of weight are inseparably connected with those of length and capacity; that the imperial gallon—to which we are committed—is a measure which contains 10lbs. of water; that the cubic foot—to which we are also committed through its multiple the yard—is a measure which contains 6¼ gallons or 62½lbs. of water;—and that, having adopted two of the three series of standards, we should be illogical in rejecting the third.

Many of these arguments have already been put forward in the exhaustive enquiry which preceded the Despatch No. 163 of 1868 from the Government of India to the Secretary of State, in which the adoption of the Metric system of weights was recommended, on the ground mainly that the Kilogramme of 2·205lbs. *Avoirdupois* approximated more nearly to the existing seer (which was stated to average 2¼lbs.), than the weight of 2lbs. This statement, however, appears to be against the weight of evidence—as the seer based on the Tola of 180 grains weighs 2·057lbs., and is therefore three times nearer the two-pound weight than it is to the Kilogramme.

It is also said that "To reduce the seer to 2lbs. would be extremely unpopular and objectionable."

This, again, is against the weight of evidence. We have it on record in Mr. Symonds's letter of 14th March 1888 that "English weights of 2lbs. Avoirdupois are in use in some places with a hollow scooped in the bottom to reduce the weight."

There can be little doubt but that an attempt to *increase* the weight of the seer would meet with the passive opposition of all retailers; and *e contra*, that a slight diminution of the weight would be acceptable, and would

be at once adopted in practice. But in reality it is not a question of increase or diminution, but of unification. It is admitted on all sides that a great diversity of weights exists. Even the number of tolas in a seer varies from 70 to 100; and the number of maunds in a ton is reckoned at 27 by the merchants and 30 by the factories. The scale now put forward lies well within these limits, and has the incontestable advantage of assimilating the British and Indian systems.

In 1867—71, when the Government of India was induced to support the proposal for adopting the Kilogramme as the standard of weight, the agitation in favour of the Metric system was at its height. The craze reached to the extent of a delusion. The Bengal Committee "considered it a fallacy to seek for approximation with English weights and measures when those are on the brink of a tremendous change. In their opinion, the days of the foot, acre, and pound were in all probability numbered." England, America, and India legalized the employment of the Metric system, and its sanguine advocates prophesied the proximate extinction of the old weights and measures; but after twenty years we find them quite as strongly established as ever, and the permissive legislation practically remains inoperative.

Of the enormous sea-borne trade with India, foreign shipping only amounts to one-seventh of the whole, and native craft to one-seventeenth. The aggregate value of the imports and exports is about Rx. 160,000,000, of which Rx. 130,000,000 at least represents goods which are estimated in British standards of weights and measures. The question now presenting itself is simplified by the removal of the Metric system from the field, and it resolves itself into a choice between the two scales already described in detail in this paper. Some important representative bodies in Bombay have expressed a desire to have the English system introduced. There can hardly be a doubt that all the export and import merchants would be unanimous on the point, and in the face of the steady growth and extension of the employment of British measures in India, the balance of advantage appears to be very strongly in favour of the simple plan which will give us British standards of weight without any material changes in those in general use in India, and without any alteration in the local nomenclature.

The scale set forth in Table B, based on the Tola of 175 grains, might be termed *Imperial Indian Weights and Measures;* and, in legislating, might be made permissive for three years and compulsory thereafter. The fact that standards of British weights and measures exist, and are procurable with the greatest facility, entirely relieves the proposal of one of the difficulties inherent on the introduction of an essentially new system; for this is merely an assimilation of old ones. An Act providing for the introduction of the scale of weights and measures based on the Tola of 175 grains should contain a clause enacting that contracts and liabilities incurred on the basis of

the Tola of 180 grains should be subject to the requisite modification in the ratio of 36 to 35. For example, a price of so many rupees per maund of the latter standard would be subject to a reduction of one pie in every three annas; and a quantity of so many seers (of 2½lbs. Troy) per rupee should be increased in the ratio of 35 to 33.

It is not, however, conceived that in the ordinary transaction of business any difficulty would occur, as the advantages of the change to those most interested are too obvious.

The matter is one of far greater importance than at first sight it may appear to be. Upon the decision arrived at, will depend the whole system of weights and measures in India for possibly more than a generation; and if the opportunity of assimilating the standards of every-day life in India with those which pervade the whole of the rest of the British Empire is lost, or set aside, a gratuitous obstacle will be set up in restraint of commerce; and an unnecessary difficulty will be thrown in the path of Indians whose education in the superior scientific branches must be conducted, every day more and more, in English lines of thought; and who already, in the ordinary dealings of practical life, buy and sell and think and estimate in British standards whenever they wish for precision. We have legislated in Gallons and Pounds and Yards and Acres and Miles. Every official in the country is bound to be acquainted with these standards. Why then should we go out of our way to devise what is really a new system, for it is admitted not to be an accepted one, but a compromise founded on the tola, a weight which in practice is only used for letters.

A new rupee may weigh 18 grains, but I venture to think that the great bulk of the coinage in circulation approaches as nearly to 175 grains as to 180.

If we set aside this single obstacle, the British system is easily applicable all round to the Indian measures of weight and capacity (which are as yet undetermined and variable) with a degree of simplicity which is phenomenal. Two Ounces make a Chittack, 8 Chittacks make a Pound, 2 Pounds make a Seer, 10 Chittacks make a Pint, 5 Seers make a Gallon, 1 Maund makes a Bushel, and 28 Maunds make a Ton—all absolutely accurate, without a fraction of deviation.

Surely the analogy is far too tempting to be lightly rejected, after we have already gone so far in introducing the standards of the British Empire.

10-2-90.

J. C. ARDAGH.

Government of India Central Printing Office.—No. 1366 H. D.—15-2-90.—455.—W. B. G.

CURRENT No. ~~5/0~~

[9]

~~Final~~ Revenue Department.

Confidl No 15

Current No 2332.

From

Govt of India
Home Dept.

No. 57/8.

Dated 12th } March 90.
Received 17th }

Enclosures 7 S.C. of Letter
& of Note

SUBJECT.

Forwarding Note by Col. J. C. Ardagh on weights and measures in India.

Conf. No. 52

Office Endorsement

Transferred to the Secretary to Govt. Revenue Department.

J. Gwyn
Ag. Chief Secretary

GOVERNMENT OF MADRAS
21 MAR 90
REVENUE DEPARTMENT

L.P. 18/3

Fort St. George
20th March 1890

Endorsed

Current No. 2332.

From

Dated 18 .

FOR ORDERS.

The proposals made in this note was largely discussed in 1864-1865 when it was under consideration to remodel the system of weights and measures in this Presidency; and again in 1869-70 in the correspondence which led up to the Indian Weights and Measures act of 1871.

The systems of weights now in use ~~will be~~ also in force here, namely for Madras

Tolah of 180 grains troy	adopted by a Govt Notification of 1846.
Pallum of 3 tolahs	
Vis of 40 Pallums	
Maund of 8 Vis	

In the Coorg of Madras
Vis = 3½ lbs exactly
Maund = 25 lbs

and for Bengal

Tolah of 180 grains	adopted by a Notification of 1833.
Seer of 80 tolahs	
Maund of 40 Seers	

The seer of 24 tolahs now used in this Presidency was also in use here though not recognized by the Notification of 1846.

2. It was pointed out in the discussions referred to above that the tolah of 180 grains troy although it gave convenient equivalents for the two maunds in terms of pounds** troy was found to be highly inconvenient to trade which needs only avoir: weights and it was proposed to adopt a tolah of 175 grains so as to assimilate the Indian

** 30 and 100 pounds

systems of weights with the English system. The previous question as to whether the various systems of weights in every part of this Country had been the principal current coin and what the proposed change would disturb this convenient relation if the weight of the rupee was not at the same time changed to 175 grains; it was most essential that the weight of silver in the rupee should remain unchanged and the reduction of the weight of the rupee to 175 grains under this condition might raise its fineness to such an extent as to interfere with its durability. The Madras Correspondence on the subject is given in the book labelled 3860. The book marked 3861 is a paper by Sir John Strachey President of the Committee appointed by the Govt of India to consider the question of introducing a uniform Standard of weights and measures throughout India. Sir John Strachey held that the system of weights based on the Rupee of 180 grains had no claims whatever for consideration, for gold was destined to be the future currency of India and the finality of the rupee was doubtful; he also rejected the proposal to have a Rupee of 175 grains a Seer of 2 lbs, for the main system of England was doomed and likely to be replaced by the French Decimal system which was generally being adopted throughout Europe. Both these predictions have been falsified: the main system is as firmly established in England as ever, and unless there is some improbable and unexpected change in the conditions of production of gold the rupee is

para 19 of his table

pages 22 to 28.

36

37

REVENUE DEPARTMENT.

No.

59

From

Dated 18 .

FOR ORDERS.

is sure to continue to be the principal coin of the country—

3. The note records a proposal which had been rejected mainly in view of a contingency which has not occurred and is not likely to occur; and so far as it relates to a change in the system of weights by means of an initial change in the weight of the Rupee the proposal cannot be held to be impracticable. In this Presidency the weight of the Rupee was once increased from about 175 to 180 grains weights at the Pallum, Viss and maund adjusted to the new rupee, and there seem to be no reason why the conversion to the old weights of the rupee and a corresponding readjustment of the other weights should not be generally acquiesced in by the public; a Madras Maund will then be equal to 25 lbs; but it is open to question whether the Bengal maund of 80 lbs will be adopted in this Presidency without compulsory legislation

The note also proposes to

see page 4 of the note for the note please

The note says that the change may be effected leaving the weight of the Rupee as it is. (See also paras 17 & 18 of Sir John Strachey's paper)

capacity with reference to the
Standards of weight and it is
in this connection most difficulty
is likely to be experienced in
this Presidency. There is ~~always~~ in England
and France a connection between
the Standards of weight & of capacity
the connecting medium being
water. Thus an oz volume of
water at 62° Fahr and at 30 in
Barometric Pressure ~~is~~ weighs an oz avoir; ~~and~~
and a litre of water at 4° centi
grade and the standard barometric
Pressure (Sea level) weighs exactly
a Kilogramme. The rule proposes
to establish a similar relation in
this country, ~~the~~ conditions at which
the relation is to hold being the
same as those adopted in England;
that is to say a Seer volume of
water at 62° Fahr 30 in Pressure is
to weigh exactly a Seer.

Full information is not avail-
able as to the liquid measures of ca-
pacity in ~~use in~~ this Presidency, but from
the brief notices on the subject in
Bayley's memorandum & Maclean's
manual of administration it appears
that ~~liquids like~~ oil & ghee are sold
by weight in some places and
by measure throughout the greater
part of the Presidency the measures
used being the smaller grain
measures. Milk & butter milk
~~as we know~~ are everywhere sold by measure.

Now there ~~is no~~ connection between the ~~liquid~~ &

It is believed that in some places
oil & ghee are sold by weight as well
as by measure; the measure must
then be adjusted to the weight;
how this is effected is not known. In
Tanjore again may speak of a Seer
& Viss of oil or ghee but the liquids
are invariably measured.

It may therefore be laid down
throughout the greater part of the Presy
the only measures of capacity
are the grain measures

Bayley page 28 para 10

weights and of measures in use
in this Presidency although the
latter seem to have been originally
founded on the weight of grain they would
hold. The results of the enquiry
(1857) into the Standards of grain
measures showed the total inde-
pendence of the two systems but
since that year modifications
have been introduced from time
to time in the Standard measures
so as to bring them into accordance
the Imperial Seer of 80 tolahs,
and to this ~~Chief~~ President to which
this object has been accomplished
the grain measures may be said
to have been adjusted to the
Railway System of weights the
connecting link being not water
but average Seconds Sowrice.

It is open to question whether,
in these circumstances, any proposal
to adjust the measures to weights
through the medium of water would
be practicable. Sir John Shore
was of opinion that advantage
might be taken of the practice
of keeping grain ~~exactly~~ properly
cleaning the diameters of measures
they might be made to contain
the same weight of grain & of
water. Calculation shows that
for this purpose the dimensions
of a measure to contain 120 tolahs
of rice should be diameter 6 in,
depth 3 inches. In the first place
it is open to question whether

Paras 6 5-16 of his paper

Same

$\frac{1}{5}$ that is 24 tolahs must be heap-
ed which corresponds to 6 in diameter (Bayley)
The remainder 96 tolahs = 85·8 c: in
(the means of Tamil & Telugu rice in the appendix
the depth is $\frac{85.8}{\pi \cdot 3^2} = \frac{85.8}{28.3}$ As B.S.O
= slightly over 3 inches

such and unsightly measure will ever become generally befriended; Secondly the larger the diameter the greater the [redacted] for that measure [redacted] and any attempt to unduly enlarge the diameter is to be deprecated

FOR ORDERS.

RS
24/4 It is ordered that the Resolution for India Nº 23. Jan/90 is "Laid before the Hon^ble H^s Lords. CR. Copies thereof are to be sent to the Secretary of State.

The Hon^ble H^s Lords
C.S.

25/4

42

FOR ORDERS.

Papers relating to
Weights & Measures.

The Hon^ble Mr Swan
The Hon^ble Mr Scanlen
C.S.

REVENUE DEPARTMENT.

No. Papers relating to Weights & Measures returned by the Hon^ble Mr Stokes.

From

Dated 18

FOR ORDERS.

Orders are solicited regarding the disposal of the papers relating to Weights & Measures returned by the Hon^ble Mr. Stokes.

A packet marked I contains the results of the experiments with glass measures ordered in accordance with the instructions contained in C.O. of 31 Aug/88 No 600. The Minute by Chemist here for the glass measures in use at the Customs Station, the Registrar enforce the prescribed standard and how far the Govt bill be taken in use in

Law 12/1

to be dependent upon and
that advice can be
looked towards securing
further confirmation in
those standards. The
Specimens can only be
tested by the Standard
Yards fixed with the
Specimens of the Bronze.
Mr Stokes The weights
are submitted to the
Office the Members hitherto
have not called to deal with
the question respecting.
It is presumed the
papers must lie over
until his return.

Packet 2. is a Resolution
of the Govt of India on the
question of prescribing
a uniform system of
Weights & Measures.
A Report so was sent in February
to the Hon'ble Mr Stokes but
he does not appear to have
looked at it. A Letter
from Stokes connected with it.

I have signed it
JG

Yes JG HS

I have signed the
Report which was
prepared by the Standard
Office who conducted
the Experiments with
great accuracy upon
the subject thoroughly.
The Board had thought
best to defer the Report
& conclusion on the subject
till the Office should go out
more generally & test
their Elaborate Series of
Resolution were issued.

Yes JG HS

Packet No 3 is connected
with the Resolution
contained in Packet 2.
Colonel Clerk's letter
dated 7th June forwarded the
Report for consideration
in connection with the
Resolution.

Yes JG HS

Let that the Hon'ble
Stokes should be seen in
connection with these
papers and that he should
hear from Col Clerk's
plan, however this

FOR ORDERS.

9

Copies + extracts.

The Hon'ble Mr. Stokes C.S.I.

The Hon'ble Mr. Garstin C.S.I.

REVENUE DEPARTMENT.

7

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read Ltr No 855 dt 2332.

G.O. No 4413 dt 17th July 1890

Referred to the Board of Revenue for ~~report~~ report in communication with the ~~Collectors~~ District officers.

2. The points on which information or an expression of opinion is desired are:—

(a) The standard measures of weight and of capacity in use in each district, and the extent to which they are used in the different kinds of transactions.

(b) Whether there is any system of weights and measures which is capable of being generally adopted throughout the Presidency.

(c) Whether the general adoption on the Railways of the maund of 40 seers of 80 tolas each has made this system sufficiently familiar to the people as to render it probable that it would be more easily accepted than any others.

(d) What are the steps, if any, besides those indicated in clau-

8 of act XXXI of 1871 which might with advantage be taken to promote the adoption by the people of a uniform system of weights and measures.

2) Section 3 of the act to connect the units of weight and volume that a unit of volume of water at its maximum density shall be exactly a unit of weight. Is any such relation observable between the weights and measures in use by the people? And is it desirable & practicable to establish this relation in the case of dry measures.?

3. With reference to 2 (a) above. the Govt has before it full and detailed information regarding the grain measures and bell-measures in use in all parts of the Pres.; the present investigation by the Board, will be confined only to measures of weights and liquid measures of capacity. With reference to the table it is noted that liquids like oil, ghee &c are sometimes sold by measure as well as by weight in some localities; full information should be given in all such cases as to whether the dealers have a separate measure for each kind of liquid and what safeguards the people have against fraud and unfair dealing.

To the B. of Rev.
(Rl. Dept.)

127

5

REVENUE DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read

4.

4. The letter read above will also be communicated to the principal trading communities and associations of this Pres: who will be invited to aid His Excellency the Governor in Council with their remarks and suggestions on the points mentioned in para 2. above.

To
The Board of Revenue.
The Madras Chamber of Commerce
The Cocanada Chamber of Commerce
The Madras Grades association
Messrs Arbuthnot & Co.
Mr. Minchin of Arkee
Mr. A. Sabhapathi Mudaliar of Bellary
The Wynaad planters' Assocn
" Peermade " "
" Nilgiri " "

10-11-98

14-6-99

24-8-99

17/1/01

17.1.01

29-7-01

22-3-12

3-12-13

4-7-16

C.M. 855

H. 90 210/93.

17.1.1900