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# A SURVEY OF THE MADRAS DAIRY TRADE

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# A SURVEY OF THE MADRAS DAIRY TRADE



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# A SURVEY OF THE MADRAS DAIRY TRADE.

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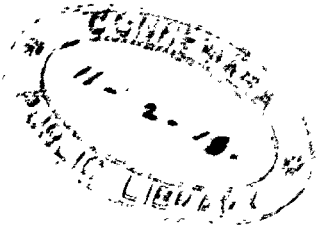

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# A SURVEY OF THE MADRAS DAIRY TRADE.

## PART I.

### CATTLE YARDS.

1. *Registered cattle yards.*—The number of registered cattle yards in the city is 686 and the inspections were confined to them. The total number of registered cows is ~~1,339~~, buffaloes ~~2,988~~, but in addition a considerable number of both are in private hands and left out of account. The great majority own only a few animals, and the number is usually made up of cows or buffaloes or of a mixed herd of these. In addition are the calves, together in a few cases with one or two young stock. There is also a number of goats in the city, but few are kept by professional milkmen.

2. *Source of supply.*—The main source of supply is the cows and buffaloes kept within the city itself No milk arrives by rail consigned as such, but there is the possibility of small quantities reaching the city by railway passengers from the districts.

Adjoining villages contribute certain quantities this is estimated at 400 * Madras measures buffalo milk per day.

3. *Method of inspection.*—For the purposes of sanitary administration, the city is divided into 20 divisions. The Health Officer told off the sanitary inspector for the particular division to accompany me during the inspection. Arrangements were made to see the best and worst yards in each locality, also those considered to represent the average. Altogether 121 special inspections of cattle and yards, in which the dairymen were interviewed and reports prepared were made, also in addition about 100 general inspections to observe practices followed, etc. It was frequently found that during the latter visits in a district the dairymen appeared to have heard of the inspections, and, it was quite evident that, although such yards were badly enough kept, their usual condition was very much worse. Fairly well-kept yards are so few that it is not considered advisable to deal with them in this report, thus with this mention they are dismissed.

4. *Approaches and surroundings.*—The passages leading to the cattle yards are in many cases through the living quarters. The drains in the vicinity without exception have a very, filthy smell. In many cases, people are seen using open sewage channels as latrines, thus some of the passage leading to the cattle yards are in a very bad state. The yards are generally in the most congested areas and are surrounded by fairly high buildings. Such situations make efficient ventilation a practical impossibility

5. *General appearance of yards.*—On entering a cattle yard it is frequently found that the animals are packed in as tightly as they

* 1 Madras measure = 62·5 fluid oz. = ·39 gallon.

can stand. The square in the centre of the passage behind is often used for the accommodation of animals, and the effect of this on general cleanliness is very injurious. The calves are tied around anywhere, thus the whole place is entirely wanting in order.

Cows and buffaloes on getting up are covered with droppings and filth, generally on the hips, flanks and udders. No bedding is used. Everywhere the heavy animal smell which is characteristic of overcrowding is felt. The whole impression is one of disgust. One wonders that animals can live under such conditions and that it is possible for any consumer of milk to escape being stricken by disease.

In this connection it is important to note that, as the grazing area available for Madras milk cattle, either in the city or near it, is very restricted, most of the animals spend the greater part of their time in such sheds. While it is undesirable at all times that animals should occupy unhealthy quarters, still, the injury to health varies with continuous and intermittent periods in such places, greater injury of course being done under the former.

6. *General construction of yards.*—In general construction the sheds and yards are of two types, the particular form depending on the surrounding buildings. The first has the sheds round a square in the centre which is open over head.

In the second, the cattle stand in a row facing a wall from which the roof projects, with a passage behind which is open over head. In the case of the first type, living quarters are in some cases on one side of the square, while in the second they may be at either end. Again there are many nondescript forms which are dealt with by mention.

7. *Floors.*—With rare exceptions these are very badly kept. Droppings having accumulated for several days and putrefying give a most offensive smell. Some yards are provided with a cement trough for keeping the manure, others have it piled up in the corners, while again in some it lies about on the floor. Such conditions as these produce an overbearing stench and must have a very injurious effect on the people of the locality as well as on the cattle. It may be observed that such undesirable smells vary with the manner in which the cattle yard is kept, as well as with the nature of the floor, and it will be apparent that the latter two kinds of floors named hereunder are much worse than the first.

The floors of the cattle yards vary very much ; some are flagged and the joints grouted with cement, others although flagged, the joints are not grouted, while again many have earthen floors. In every case the floor construction is very faulty from the point of view of keeping the animals clean, and as a general rule arrangements for cleansing are not as efficient as they ought to be.

It may be here mentioned that the cowsheds as at present constructed keep the animals as dirty as possible. No arrangements are made for keeping the cattle standing straight in the stalls, and the result is that they lie down in such a way that the udder comes right on the top of the droppings.

8. *Walls.*—Walls are very badly kept and in no case was any trace of lime washing to be observed. These are covered over with cow-dung cakes which are being dried. It is not uncommon

to see the walls covered all round with the cakes, that in front of the animals not being excepted.

9. *Roofs.*—Roofs vary from tiles to those constructed with various kinds of leaves. Bratties or cow-dung cakes are also dried on the roofs. While objectionable in all cases, is it particularly so on a leaf roof for the very obvious reasons that particles will drop into the milk. No provision is made for ventilation in any of the tile roofs nor can air as a rule be admitted through the head walls; thus the part of the atmosphere which reaches the nostrils has passed over the droppings from behind and become contaminated. Further there is a certain accumulation of breath under the roof, and the re-inhaling of part of this must be very harmful. All the roofs are too short to provide good sunshade for the stock at all hours during the day. When the sun strikes the animals, especially the buffaloes, they turn broadside round on the stand as far as possible in an attempt to reach the shade.

This discomfort is against the milk yield and the health of the stock.

In these respects some sheds are worse than others, the exposure being the principal determining factor. Such defects indirectly are one of the causes of the stock being dirty. The droppings may fall on any part of the floor between the passage behind and the neighbouring animals' head, with results already observed.

10. *Food troughs.*—It is a common practice to ferment the food before feeding especially in the case of buffaloes. For this purpose cement troughs or barrels are provided. The length of time during which fermentation is allowed to go on varies, but in general practice the troughs are never cleaned out; thus one lot of food is thrown in on the top of a portion of the previous day's or two days,' etc. Such fermentation gives rise to a very bad smell.

11. *Wells and taps.—Wells.*—Wells are quite frequently found in the cattle yards and in usual construction have a wall 2½ to 3 feet high from the floor, and built up inside. They are of very variable depths. In a number of cases they smell very badly and contribute their quota to the already poisoned atmosphere.

*Taps—City supply of water.*—Some yards are provided with taps, others are not. The use of well water for cleansing anything that comes in contact with the milk is very unsatisfactory.

12. *Latrines.*—Latrines used by the people of the locality are found in some of the cattle yards. It is almost impossible to bear the odour which comes from such places.

13. *Drainage.*—This is generally unsatisfactory either from want of sufficient fall in the proper direction or from want of efficient channels. Even where attempts are made to keep a cattle yard clean, the work is less effective on account of the bad drainage.

14. *Classification of cattle yards.*—To give a general idea on a few points, a classification of the yards has been adopted (see table below). On the average it will be seen that 62 per cent of the yards have separate entrances for the cattle, while 38 per cent have not. Again the number of yards which are separate from living quarters works out at 53 per cent, while in 47 per cent the cattle and the dairyman's family are housed around a common

square, etc. It will be seen from the table that the divisions vary much under these heads. The higher the percentage in columns 3 and 5, the more advanced the division from these points of view. This illustrates how it has been found possible to make more progress in some divisions than in others, and that more has been done all round to better the general conditions. A further point is that, amidst those developments, the dairymen are having it brought home to them that certain changes are necessary and that more up-to-date methods are required. It will also be noted from remarks on floors, etc., that considerable advance has been made in many cases by paving. While the yards are still bad enough, there is no doubt that some years ago they were rather worse than at present.

*Classification of cattle yards.*

| Division number. | Total number in each division. | Percentages of | | | |
|---|---|---|---|---|---|
| | | Yards with separate entrances for cattle. | Passages to yard through family living quarters. | Family living quarters separate from the cattle yard. | Family quarters and cattle yards around a common square. |
| (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | 21 | 65 | 35 | 24 | 76 |
| 2 | 24 | 50 | 50 | 75 | 25 |
| 3 | 21 | 76 | 24 | 37 | 63 |
| 4 | 12 | 54 | 46 | 38 | 62 |
| 5 | 40 | 88 | 12 | 8 | 92 |
| 6 | 36 | 77 | 23 | 53 | 47 |
| 7 | 68 | 52 | 48 | 45 | 55 |
| 8 | 48 | 31 | 69 | 94 | 6 |
| 9 | 28 | 50 | 50 | 43 | 57 |
| 10 | 11 | 100 | ... | 99 | 1 |
| 11 | 40 | 67 | 33 | 46 | 54 |
| 12 | 44 | 76 | 24 | 81 | 19 |
| 13 | 23 | 91 | 9 | 23 | 77 |
| 14 | 2 | ... | ... | ... | |
| 15 | 24 | 61 | 39 | 35 | 65 |
| 16 | 49 | 70 | 30 | 60 | 40 |
| 17 | 74 | 40 | 60 | 33 | 67 |
| 18 | 60 | 55 | 44 | 72 | 28 |
| 19 | 43 | 55 | 45 | 83 | 17 |
| 20 | 18 | 25 | 75 | ... | ... |
| Total ... | 686 | | ... | .. | ... |
| | | 62 | 38 | 53 | 47 |
| | | Averages. | | | |

In division No. 14 the number of cattle yards is so small that it has been omitted from the calculation when striking the average. Division No. 20 did not admit of the common classification under columns 5 and 6 and has been omitted from the averages under those columns.

15. *Ownership of yards.*—Regarding the ownership of buildings and yards, many systems prevail. They may be classed as follows:—

(*a*) Buildings and site owned by landlords.
(*b*) Buildings owned by tenant and the site by a landlord.
(*c*) Buildings and site owned by the dairyman.

This matter was taken up in connection with necessary improvements. In the A class, the dairyman states that when repairs, etc., are asked for, the landlord often gives notice to quit. Under these circumstances the dairyman may have to execute the repairs himself or lose the licence. After the dairyman does the repairs, the relations between landlord and tenant are still further complicated. In class B the arrangements are usually very complicated. The lease of the site may be for a certain number of years. In some cases the living quarters belong to the landlord, and the cattle sheds to the dairyman. While the "B" arrangement is unsatisfactory from all points of view, the variations of it are even more so, and do not tend towards smooth working.

Class C provides for the simplest administration. When a yard is condemned, there is no shifting of responsibility. Another point is that the buildings are much better looked after than in the other classes.

Much might be said in connection with the relationships between the parties that are interested in cowsheds—landlords—tenants—corporation—and milk consumers, but that is rather outside the scope of this report.

16. *General note.*—From previous experience of pioneer work I appreciate full well the great efforts that are necessary to obtain slight improvements, also the fact that the more inefficient and out of date people are in connection with an industry, the greater the difficulty in getting them to see the necessity for any advancement. Thus I am able to sympathize with the various authorities in their attempt to solve this perplexing problem. From what has been said it will be seen that the Madras cattle yards reach the absolute limit for filth and that it is impossible to understand how life can exist with such surroundings. To produce every detail is not desirable, as it would over-burden the report. What has been aimed at is broad general survey of the situation.

In general terms it may be stated that the more congested the particular part of the city, the more offensive the smell in the cattle yards. An odd yard, in a congested area, fairly well kept, smells worse than one that is not so well kept in an open area. In order to keep cattle yards properly, a certain air space both outside and inside is required in addition to efficient sanitation. So far as I am aware, nothing has been done in India to find the dimensions necessary in cities per animal, but it is quite plain that it would not be possible to secure healthy conditions in the congested areas of the city. To those who have studied the question of civic developments in other countries, it will be apparent that nearly all corporations, etc., class cattle in the city under the head of "Nuisance." That being so, legislation proceeds on the lines of making a nuisance as harmless as possible to the well-being of the population. Again sanitary science as applied to health of cities is progressive. Certain works are executed which are usually looked on as a stepping stone towards some further improvements. Thus the sanitary laws devolop and become more efficient. The farther the sanitary law develops the more stringent are the regulations which apply to nuisances. Thus in the final phase regulations which apply to cattle yards are framed from the point of view of the bearing of a nuisance on

the health of the people. Therefore the by-laws which apply to cattle sheds may have little or no bearing on what is necessary or desirable for the well being of the animals. When this stage is reached it becomes uneconomic to attempt to produce milk in the inside of the city. Madras may be looked on as at present passing through the initial stage, and it is inconceivable that what the corporation consider a satisfactory cattle yard to-day will be looked on as meeting the requirements several years hence.

Such an unstable state of affairs requires very serious consideration in order to avoid tentative experiments, many of which are costly—only last for a few years—and contribute but little towards the final solution.

## PART II.

### MILKING AND MILK VESSELS.

17. *Cleansing udders.*—This is done in a very dirty fashion. Indeed so much so that it is questionable whether any advantages are derived from it or not. Water is thrown with the hands from a vessel against the udder—the udder is then hand rubbed but not dried. Drops of dirty water fall into the milk. It should further be noted that the milkers' hands are either improperly washed or not washed at all.

While cleansing of udders is desirable, at the same time it should be observed that the operation is much more effective when the udder is fairly clean than when it is very dirty. After a cow lies down on her droppings, it is in practice almost impossible to make the udder really clean before milking. On the other hand, when a cow's udder is fairly clean to begin with, the operation is effective. These remarks show that proper floor design and construction have a most important bearing on a pure milk supply.

18. *Milkers' hands and Milking.*—It may also be noticed here that in some cases the person that milks also sells the dung, and that in collecting from the floor and when selling, it is slobbered all over the hands. It is impossible that the method of washing practised can make such hands clean before commencing to milk.

Even when the dairyman washes his hands when preparing to draw the milk, any effect of that is nullified by the fact that he usually puts his hands against the cow's side, etc., or adjusts a dirty cloth, etc., in the interval between such preparation and milking. During the milking operation, excess of milk for moistening the hands is often applied with the result that drops of milk used for lubrication fall into the milk vessel, and brings with it all sorts of contamination.

The finger and thumb method of extraction is frequently practised and in such an inefficient way that contamination results in two ways :—

(*a*) From matter between the hand and the teat.

(*b*) By part of the milk being squirted against the lower part of the hand.

The method of whole hand milking is also very bad from the point of view of cleanliness, and the practice of including the thumb with the teat in the ball of the hand is generally followed. Whole hand milking as practised is a modified finger and thumb method.

The standard of milk extraction is very low and must injuriously affect both the quantity of milk yielded during the lactation period, and the quality particularly as regards butter fat.

Cleansing done with water from wells in a cattle yard, except perhaps for washing the floor and flushing drains, is very ineffective—indeed quite useless so far as hands, udders and milk vessels, etc., are concerned. The water to begin with must be contaminated, and the result is that it may add to the contamination of anything that it touches. The dairymen admit that such water from wells is used for these purposes.

19. *Condition of milk vessels.*- These are never properly washed and form a breeding ground for all sorts of germs. They are usually cleaned in a slip-shod way—some cold water is put in, then the palm of the hand and the fingers are run round, the water is now poured out, then a little more put in, shaken up, and afterwards poured out. The use of water (*a*) cold, (*b*) warm, (*c*) and boiling in the order named, one operation following another, was not in a single instance observed, nor were any vessels seen that appeared to be cleaned in that way. The finishing touch to efficient cleaning, namely, airing in the sun, is not practised.

20. *General note—Cleanliness.*—When everything is considered that relates to a pure milk supply, the Madras milk is in a very bad state. The defects noted under housing and yards—cleansing yards, milk vessels, udders, hands, etc., singly and combined—have a most injurious influence on the purity of the produce.

From the point of view of public health, milk produced under such conditions cannot be wholesome, even although it is unadulterated. Milk is generally boiled before consumption, and while this ought to be a precautionary measure only, it is one of real necessity. Boiling adds to the safety of the food by killing disease germs which may be present, prolongs the period for which the milk will keep sweet; but the filth which has gained entrance remains, and may have injurious results. Both physical and chemical changes take place during the operation, and the general result is that the value of milk as a food is distracted from, especially for infants.

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## PART III.

## ECONOMICS ON THE BASIS OF PURE MILK MILKED IN PRESENCE OF CONSUMER.

21. In general terms it may be stated it is almost impossible to fathom by enquiry the true existing economical position of the dairymen in the city of Madras. In making enquiry into the milk yield, there was a general holding back of full information and of the true facts. This in fine is due to a belief amongst the dairymen to the effect that if the correct yield of milk is given, especially if

fairly satisfactory, the cow will give less at the next milking, and probably a reduced quantity for the next few days.

This one example is given as typical, and showing the difficulty of getting to know things as they exist. Seeing that the evidence taken is subject to such limitations, I do not propose to enter into the more intricate economics, not because of being unimportant, but because the conclusions would be subject to so many deductions, and are therefore considered to be outwith the scope of this report.

Subject to these remarks, a few of the simpler problems may be briefly discussed; indeed they will serve the present purpose, and are divided into three groups :—

(A) Cost of production of milk.
(B) Value of produce : (*a*) Milk, (*b*) Calves.
(C) Exchange.

Since the dairymen have all the grades of cows, also some buffaloes, it is not possible to treat the economics on the whole herd basis. It has been found advisable to take the case of a single average cow and buffalo, and treat the economics on that basis. While this method is not free from objections, it is the only one that can be adopted when all the circumstances are taken into account.

22. *Capital invested in stock "Cows."*—This falls under two heads :—

(*a*) Purchase price.
(*b*) Cost of rearing.

Dairy herds in Madras are maintained by these two methods, either separate and distinct, or partly by each. It appears that purchase, where it is not the practice entirely relied on, forms the larger proportion. A few parties who keep one or two cows, especially if the animals are good milkers and regular breeders, maintain the number by rearing. This practice is not general, and even where followed, there is no doubt that the owner has occasionally to enter the market.

The approximate cost of rearing could not be ascertained exactly, but there is no question whatever that it is much higher in Madras than in the country district.

Taking together the actual cost of food required in Madras for rearing a calf up to 3½ years old, when the first calf may be born, and lumping all other expenses as contingencies, the cost of production will be over Rs. 130. It is found that there is generally some special economic reason for rearing a calf to come into the herd. This does not affect the calculation in the end, as the extra initial cost of rearing balance will be regained.

For fairly good first calf Nellore cows, they generally cost Rs. 130 on the average when landed in Madras, and for the purpose of calculation, the input price or cost of rearing may be taken at Rs. 130.

There are a number of cattle of various breeds in Madras, but the Ongoles and Ongole type predominate, and are taken as the basis. There are a considerable number of cross bred cows—mostly Jersey—Ongoles, etc.—Ayrshire—Ongole, etc., and mixtures of these cross breds; such may be classed on the basis of cost of rearing with those mentioned above.

Again, there is in existence a peculiar system of rearing the best calves for the herd. The calves are sent to a village, when

eight months old, where the dairyman knows a number of ryots. The ryot rears the calf until she gives birth to her first calf—then the yield of the milk for the first lactation and the calf are allowed to him by the dairyman in lieu of rearing expenses. The ryots keep the cows until the second calving, then she is returned to the owner. If the calf dies in the rearing no claim is made by either party, and the matter is treated as a mutual loss.

The cost of production here may be taken as equal to the rearing charges in Madras. While the food in the country is cheaper and more roughage available, the considerations are balanced by (*a*) the cow is one year later in being productive from the dairyman's point of view, and (*b*) the system requires more capital. How this affects the ryot is outwith the scope of the enquiry.

23. *Depreciation.*—No dairy stock is managed on the incremental nor on the balance scale. All are run on the basis of depreciation. Taking the initial cost at Rs. 130, the cattle may be divided into three groups for the purpose of estimating the depreciation :—

(*a*) First class Ongole cows.
(*b*) Second class ,,
(*c*) Cross bred cows. (Foreign blood.)

The dairymen consider that a first class cow should give six calves and a second class animal four. In addition to that, the first class cows are better milkers, and are retained for a longer period, indeed, as long as they will breed, while the second class cows are disposed of earlier on account of the lower yield of milk.

The initial cost of first and second class cows appears to be about the same as purchase at first calving is largely practised. It is only after trial in the herd that the dairyman decides to which class they belong. A little cattle dealing amongst the dairymen is practised. In such cases the price varies with the milk yield and quality of the animal. This is treated as a side line. So far as could be ascertained, about 60 per cent of Ongole cows are considered to be first class—40 per cent second class—while the majority of the cross bred cows are agreed to belong to a group above the first class. Cross bred cows have on the average about seven calves. The same dairyman may have cows belonging to all the groups, and this makes the striking of an average very difficult. Taking everything into account, it seems that the total average calvings of these groups is approximately five, and that the duration of that period is about 6 years. Breeding appear to be more regular and at shorter intervals during the first half of the calvings.

In estimating the output price, the animals at the slaughter-house on what represented an average day for quality and numbers, were inspected. The cattle representing the type kept by the Madras dairyman were few, and all of them could be classed either as barren or as very bad milkers. A number of cows when past breeding are sold to the districts to produce manure.

Taking the cows, they may be classified for slaughter purposes as :—

(*a*) Very good ; (*b*) Good ; (*c*) Fair ; (*d*) Bad.

Only two animals were classed (*a*) and it could not be ascertained whether they were from Madras or the districts. As milk producers they were quite useless, and belonged to the second class of the Ongoles.

The average cattle from the Madras dairyman may be classed as good. When past breeding they have an average value of about Rs. 30. Taking the input price at Rs. 130 and the output price at Rs. 30, the total depreciation over the period is Rs. 100. That amount is written off during the first four calving periods in accordance with the lines indicated. This is sound practice and to some extent insures many contingencies. Except where otherwise stated "A period" includes a lactation period, and the dry period which follows.

There is no question that, in the case of good milkers, there is an appreciation in the value of the animal up to the second or third calving, but as these cows are generally retained, the increment is (*a*) non-realizable and (*b*) not produced by additional expenditure, it therefore forms no part of the calculation.

Under depreciation, the dairymen are considered to be working with flying stocks and treated accordingly.

When a herd is maintained by purchase, and the same animals disposed of at a later date for some economic reason, the term 'flying stock' is usually applied.

In the Madras dairy herds, the cattle are purchased at their maximum value—then disposed of at the practical minimum value, hence it follows that the periodical depreciation system is the particular one which is applicable.

In another system, some dairymen put out the cows at the close of each lactation period. If the animals are young and of a good type—good milkers and in calf, they are exchanged for cows in milk on the basis of 75 per cent of the purchase price. If the cow costs Rs. 130, her exchange value is Rs. 97-8-0. In this instance the depreciation is Rs. 32-8-0. At the same time it must be remembered that the dealer who has a cow in milk for sale or exchange is more favourably placed for striking a bargain, thus the depreciation is in actual practice rather higher than the above mentioned.

The party taking over the dry cow considers her possibilities at the next calving, therefore in the case of a second class milker the depreciation is high, and may reach 50 per cent or even more.

If an animal is not in calf, the exchange is made on the slaughter value. This system does not vary enough from the typical example to justify a separate consideration.

24. *Interest on capital.*—This includes interest on sums invested in all items of stock and plant, and also the ready monies and outstanding debts, etc., connected with the business. It was ascertained that the latter two items are practically non-existent, and it was quite apparent from inspection that the sum invested in plant was only nominal.

The principal outlay therefore is connected with live-stock, thus it will be sufficient for the present purpose to deal with that item only.

Reference is now made to the tables below, all of which are self explanatory, but the following remarks may be made.

It will be seen from Table I that the depreciation is deducted at the end of the various periods. That course admits of the dry period charges being added as a cost of production of milk to the period to which it properly belongs. Thus the animal at each calving is put on the revised valuation scale.

Table II shows the interest on capital invested during the six years, taken at 10 per cent per annum. It should be observed that, as the depreciation is deducted at end of the period, the full sum invested is chargeable to interest during the first period. The same rule applies throughout.

Table III deals with interest on the stock depreciation reserve fund, and the rate of earning is taken at 5 per cent. The sums to the credit of this account must always be available on short notices when required, and therefore the approximate bank rate of interest is calculated as earned.

When working with flying stocks, this fund ought to have a real existence, and whenever any weakness appears here, it is a very serious matter. The dairymen do not appear to make any provision under this head.

Taking these figures and deducting the interest under Table III from Table II, the interest on capital invested in stock is Rs. 31–2–0 per cow over a period of six years.

This may be taken as representing the better off dairymen who are able to borrow money from ordinary approved sources. Nearly all the trade stated that more or less money had to be borrowed in order to carry on; very few, if any, are working on their own private capital.

TABLE I.—*Depreciation Scale.*

| | RS. |
|---|---|
| Cows— | |
| End of first period fifteen months ... ... ... | 30 |
| End of second ,, ... .. ... | 30 |
| End of third ,, ... .. ... | 20 |
| End of fourth ,, .. ... ... | 20 |
| | 100 |

TABLE II.—*Interest on capital invested in cows.*

| | RS. | A. | P. |
|---|---|---|---|
| End of first period Rs. 130 for fifteen months at 10 per cent per annum. | 16 | 4 | 0 |
| End of second period Rs. 100 ,, ,, | 12 | 8 | 0 |
| End of third period Rs. 70 ,, ,, | 8 | 12 | 0 |
| End of fourth period Rs. 50 ,, ,, | 6 | 4 | 0 |
| End of fifth period Rs. 30 for twelve months at ,, | 3 | 0 | 0 |
| | 46 | 12 | 0 |

TABLE III.—*Interest on stock depreciation reserve fund.*

| | RS. | A. | P. |
|---|---|---|---|
| End of second period Rs. 30 for fifteen months at 5 per cent per annum. | 1 | 14 | 0 |
| End of third period Rs. 60 ,, ,, | 3 | 12 | 0 |
| End of fourth period Rs. 80 ,, ,, | 5 | 0 | 0 |
| End of fifth period Rs. 100 for twelve months ,, | 5 | 0 | 0 |
| | 15 | 10 | 0 |

Tables II and III include a carrying over period of four months in the last items respectively. It frequently happens that, during purchase of stock to maintain the milk supply and sale of cast animals, the incalf cow is purchased one to two months before calving, and the dry cow kept for a short time before sale. The total number of months required for the production of five calves was an element of a little uncertainty, and it generally appeared that the minimum had been arrived at. While the four months' allowance seems somewhat long, a lesser figure would hardly meet the case.

25. *Capital in stock—Other methods.*—There are also other ways of raising capital. In some cases, practically all the dairyman's capital is provided by the customers, and where this obtains it seems to be pretty much confined to the well-to-do classes who have the cow milked at the bungalow in presence of the purchaser or one of his staff. In a typical case of this class, the dairyman purchased all his cows and paid for them in four instalments. He had a certain income from the cows, and borrowed the remainder from his customers. The customers gave him money at the rate of 1½ rupees per cent per month. It appeared that part of the loan at least was always paid in milk. In another typical example, the interest is paid in milk. The customer, or perhaps two or three customers jointly, advance the money to purchase the cow. The dairyman supplies these with milk at the rate of three and a half Madras measures per rupee, and milks the cow in presence. The usual price of milk in the division is three measures per rupee; therefore one-half measure is paid as interest. A certain amount of the loan is repaid each month partly in milk and partly in cash. The customers also appear to share part of the losses, such as the death of a cow, etc.

As these two examples, although typical of many, do not come under what could properly be classed as dairying, they are merely described, but not considered under the economic question for the purpose of calculation.

26. *Capital advanced by money-lenders.*—The most unfortunate class of dairymen are in the hands of the money-lenders who exact an extortionate rate of interest. The following is an extract from the evidence of a dairyman who, although not in the hands of the money-lenders himself, was conversant with the methods, as many in the district borrowed from such :—

"Dairyman borrows Rs. 100. Only Rs. 50 is paid to the dairyman in cash, but the books show that Rs. 100 has been advanced. The dairyman repays the loan of Rs. 100 in such instalments as may be arranged with interests. The dairyman must always borrow from the same money-lender when an animal dies, etc., and has to be replaced. The money-lender tries to keep up the indebtedness of the dairyman as much as possible. There is thus a constant account until the dairyman's death. All through these transactions the dairyman loses and the lender gains, and once in latter's hands, few, if any, ever again become free."

In another district it was stated that the money-lenders paid Rs. 75 for every Rs. 100 borrowed, while the books showed that Rs. 100 had been advanced. The interest charged was Rs. 1-2-0

per month on the Rs. 100. The loan of Rs. 100 is repaid in instalments as arranged.

I am of opinion that there is much more underlying the money-lending system that the enquiry failed to bring to light.

27. *Death-rate during economic life.*—It was very difficult to get many statistics under this head, and even where obtained, it was frequently found that the dairyman had had a run of ill luck. On the whole it does not appear that the death-rate is abnormally high.

As the cattle are disposed of as soon as past breeding, there are few animals in the city of the older ages. Taking one period with another, five rupees per cow per annum would appear to cover losses under this head if epidemics of contagious diseases are omitted. These do not appear to be very frequent, and it has been found practically impossible to estimate the losses caused by such. These losses under this head are therefore not included in the calculation. Such outbreaks are always serious from the dairyman's point of view and upset the whole economics of the industry.

Over a period of six years, the total insurances under death-rate from ordinary causes is put at Rs. 30.

28. *Barren cows.*—A number of cows prove barren during the breeding period and are a source of loss to the business. It may be that the fault lies in some cases with the bull, but that in no way affects the loss which follows. Some give the figure at one barren cow per fifteen each year, taking the whole herd over a period of years. In most cases a cow which proves barren may have had two or three calves; therefore the loss generally falls in the second half of the economic life. In addition to that there are the consequent losses of (*a*) the long period of keep before the barren condition may be detected, (*b*) the additional expenses of purchasing another animal. The first loss comes under the head of early output before the value of the animal has been depreciated to that level. This charge appears to be Rs. 50.

Under the longer period of keep before the barren condition is detected by the dairyman, the loss is very difficult to arrive at. It appears that three months' dry period feed would meet the case, from the dairyman's point of view, equal to Rs. 15. The dairyman seem to pay considerable attention to this point, thus the loss is not large. Under additional expenses the figure is very variable. However Rs. 10 is a fair allowance.

The total loss is grouped as follows:—

| | RS. |
|---|---|
| Short economic period ... ... ... ... | 50 |
| Longer dry keep ... ... ... | 15 |
| Additional expenses ... ... ... ... | 10 |
| | 75 |

Taking the basis as 1 in every 15 per period, the amount chargeable to each cow per period is Rs. 5 or over the total period Rs. 25.

29. *Loss during attacks of disease, with consequent* :—

A. Loss of milk yield.
B. Impaired efficiency thereafter.
C. Higher depreciation.

A. (*a*) As milk cows during the production period are fairly well fed, almost in some cases forced, they are subject to many troubles connected with feeding. When the cow suffers from any of these ills the milk yield generally falls, and in addition it is frequently unfit for human consumption. This was noted to a small extent only in Madras. The loss appears to be nominal. It is not considered in this report.

(*b*) Diseases of the udder were noted in a number of instances, and in such cases there is usually the loss of a quarter. Generally, udder diseases in addition to reducing the yield, also shorten the milking period, and several of the dairymen complain of such losses.

B. Following the loss of a quarter, impaired efficiency thereafter must be taken into account. The loss, however, depends on the particular animal—some suffer very little on this score, others a good deal.

C. Higher depreciation always follows in the case of a quarter being lost, and the more valuable the cow, the greater the percentage loss. Taking the three together, the loss amounts to about Rs. 3 per period, or Rs. 15 over the average economic life.

30. The sickness charges for the period appear to be covered by Rs. 5.

31. *Service fees.*—These as a rule are about Re. 1 per animal for Ongole sires—Rs. 2 to Rs. 5 for Ayrshire, Jersy, and cross-bred bulls with foreign blood.

Taking the average at Rs. 1-8-0 per animal, Rs. 7-8-0 is the total, and covers other fees.

32. (*a*) *Foods and Feeding.*—

(i) *Retail prices of available cattle foods in Madras for quantities stated.*

| | Rs. | A. | P |
|---|---|---|---|
| Bengal gram (Chenna) in bags of 160 lb. | 8 | 4 | 0 |
| Do. crushed | 8 | 8 | 0 |
| Horse gram (Kulthi) in bags of 160 lb. | 6 | 8 | 0 |
| Do. crushed | 7 | 0 | 0 |
| Linseed in bags of 100 lb. | 10 | 0 | 0 |
| Do. crushed | 12 | 0 | 0 |
| Linseed poonac 100 lb. | 6 | 4 | 0 |
| Gingelly poonac ,, | 5 | 8 | 0 |
| Coconut poonac ,, | 5 | 0 | 0 |
| Groundnut poonac ,, | 5 | 0 | 0 |
| Dholl husk in bags of 120 lb. | 6 | 0 | 0 |
| Wheat bran, 140 lb. | 5 | 8 | 0 |
| Rice bran, 80 lb. | 2 | 0 | 0 |

(ii) *Bazaar prices in Madras paid by dairymen for foods actually used, bought in small quantities.*

| | RS. | A. | P. |
|---|---|---|---|
| Straw per twist of 13 lb. ... ... ... ... | 0 | 2 | 0 |
| Gingelly cake at Re. 1 per 5½ viss (1 viss = 3·08 lb.) per 100 lb. ... ... ... ... ... ... | 6 | 7 | 0 |
| Dholl husk at Re. 1 per 20 Madras measures (1 measure = ¾ lb.) per 100 lb. .. ... ... | 8 | 0 | 0 |

Although a large range of food stuffs is available in Madras the dairymen actually confine themselves mainly to straw, gingelly cake and dholl husk. Buying as they do in small quantities from day to day they pay from 20 to 30 per cent more than they would if they bought by the bag.

*(b) Cost of Feeding—Milking Periods.*—The principal concentrated foods used are gingelly cake, dholl husk and rice bran, while one twist of paddy straw per day is almost invariably the chief fodder for both cows and buffaloes. The cost of feeding was decided to some extent by observations as well as by the evidence. Many of the dairymen gave the cost as rather high, but in such cases it was possible to check by noting the quantity of foods fed and the condition of the animal. The balance over 2 annas per day is spent in the various concentrated foods.

On the point of the maximum quantity of food fed during the milking period, or rather the value of these, the dairymen answered the question right off. As to how the foods were reduced as the lactation period advanced, there was rather more uncertainty, but nevertheless there is some system of adjusting the feeding to the natural fall of the yield of milk. The cost of feeding the average cow during the average lactation period appears to be subdivided into at least four periods as set out below :—

| | RS. | A. | P. | |
|---|---|---|---|---|
| Four months at 7 annas daily .. ... | 266 | 14 | 0 | for five periods. |
| Two do. 6 ,, ... .. | 114 | 6 | 0 | |
| One month at 5 ,, .. ... | 46 | 12 | 0 | |
| Do. 4 ,, ... ... | 38 | 12 | 0 | |
| Total ... | 466 | 14 | 0 | |

Over the five periods the total cost of foods on that basis is thus Rs. 466–14–0.

*(c) Dry period.*– During the dry periodsthe food is generally paddy straw with a little dholl husk, and usually costs 3 annas per day. The same allowance is also made for four months as a carrying over period.

Following the lines adopted in the interest tables a period of four months dry feed is allowed to carry over for reasons there explained. It may be noted in addition that, when a cow advances in years, more food is required to produce a certain quantity of milk and maintain the body than when the animal is in her prime. This sum may be looked on to some extent as a contingency under cost of food.

Cost of the periods, on the six years' basis subject to the note below :—

| | Rs. | A. | P. |
|---|---|---|---|
| Four dry periods ... ... ... ... ... | 137 | 4 | 0 |
| Carrying over period ... ... ... ... ... | 22 | 14 | 0 |
| Total ... | 160 | 2 | 0 |

*(d) Calving shed periods.*—It is the custom to feed the incalf cows a little better during the month previous to calving. These rations generally cost As. 4–6 per day, the total for the periods being Rs. 34–14–0.

Some dairymen say that the cow should be very heavily fed for the first month after calving to enable her to regain strength rapidly. The extent to which the practice is followed is very uncertain; thus no figures for additional food for such periods have been included. In addition the system is a bad one.

The feeding charges are tabulated thus :—

| | Rs. | A. | P. |
|---|---|---|---|
| Five milking periods ... ... ... ... ... | 466 | 14 | 0 |
| Four dry periods and an allowance of four months for carrying over ... ... ... ... ... | 160 | 2 | 0 |
| Four calving shed periods ... ... ... ... | 34 | 14 | 0 |
| Total | 661 | 14 | 0 |

Interest on capital invested in food is not charged as the dairymen buy frequently and in small quantities.

33. *Cost of labour.*—The cost of labour is difficult to arrive at seeing that the smaller dairymen, who form the largest class, do nearly all the work themselves. Thus the actual money paid under this head is always small. By making an allowance for the work done by the dairymen themselves and adding to that the wages paid, the labour is taken at Rs. 3 per month during milking periods, and 8 annas for the dry periods per month. It should here be observed that two factors cause the labour charges to be high, (*a*) the small herds, and (*b*) the taking of cows to private houses to be milked.

On this basis the total labour works out at Rs. 136 per cow for the six years.

In some cases wages are paid partly in meals and partly in cash : three meals valued at a total of 3 annas, plus 2 annas in cash making a total of 5 annas per day, is mentioned as typical where such practices are followed.

34. *Rent of stalls.*—This varies much, but the average may be taken at about 8 annas per month or Rs. 6 per year. Over the period these charges amount to Rs. 36.

35. *Plant charges.*—The sum invested in plant is very small, thus it is found impossible to separate these items. Rs. 5 for the whole period covers all expenses under this head.

36. *Contingencies.*—In dairying on the scale adopted by the industry in Madras, contingencies come under most of the heads. Many of these are provided for, as will be apparent from the basis on which the calculations are made. There remains however to be added a sum for licences and other small contingencies. Rs. 30 for the whole period is required.

No charges are made under bad debts, or for floating capital, as both of these are very small.

37. *Statement of expenditure—Total for 6 years—*

| Para. | | Rs. | A. | P. |
|---|---|---|---|---|
| 22. | Capital invested, per cow ... ... ... | 130 | 0 | 0 |
| 23. | Depreciation ... ... ... ... ... | 100 | 0 | 0 |
| 24. | Interest on capital ... ... ... ... | 31 | 2 | 0 |
| 27. | Death-rate during economic period... ... | 30 | 0 | 0 |
| 28. | Barren cows . . ... ... ... ... | 25 | 0 | 0 |
| 29. | Loss of produce during attacks of diseases... | 15 | 0 | 0 |
| 30. | Sickness charges for the whole period . . | 5 | 0 | 0 |
| 31. | Service or crossing fees ... ... ... | 7 | 8 | 0 |
| 32. | Cost of food ... ... . . ... ... | 661 | 14 | 0 |
| 33. | Cost of labour ... ... .. ... | 136 | 0 | 0 |
| 34. | Rent of stalls ... ... ... ... ... | 36 | 0 | 0 |
| 35. | Plant charges... ... ... ... ... | 5 | 0 | 0 |
| 36. | General contingencies ... .. ... | 30 | 0 | 0 |
| | Total ... | 1,082 | 8 | 0 |

38. *Value of Produce—Milk.*—In estimating the yield of milk, 110 cows were milked in presence in the morning and 103 in the evening. The quantity of milk taken by the calf is not accounted for, but in any case it is very small as a general rule. These animals were brought to the General Hospital in the usual course to supply the milk. Under such circumstances it was possible to have the tests made without the diarymen knowing what was being done.

The cows as judged by the ages of the calves, represented practically all stages in lactation. The highest yields at one milking by individual animals were 4½* Madras measures for cross breds, and 2¾ for Ongoles. The lowest yield observed was ¼ measure.

The cross bred cattle represented 30 per cent of the total number. The percentage of cross bred cattle in this instance is above the average for the city. It therefore follows that the yield for the average, as struck by this method, is a little high. While there is a little apparent discrepancy here, the General Hospital figures are the best available and have been accepted, subject to the remark that they are in favour of the maximum.

In that test, the average yield was 2 Madras measures per cow per day. From the evidence and also from observations, the average lactation period is about 8 months.

The fact that the dairymen do not dry off the animals until the yield falls to one-eighth of a Madras measure per day, accounts for

* 1 Madras measure = 62 5 fluid oz. = ·39 gallon.

the apparently long lactation period when considered from the point of view of economic returns.

With the milking period at 8 months—average yield per day at 2 Madras measures—and the price at As. 6 per measure, the total returns during the five milking portions are Rs. 896-4-0.

NOTE.—For the first five days or so after calving in each period, milk has no commercial value and is partly given away and partly fed to the calf. In the five periods, therefore, a total of 25 days is deducted.

39. *Calves.*—Depending on the class of cattle and the system followed, the value of the calves vary very much. The death-rate is pretty high and appears to be almost 20 per cent. In addition to that a very large percentage of calves have no economic value whatever as they are in very starved condition. When all factors are taken into account, the value of calves works out on the average at Rs. 5 each. In accordance with the estimated death-rate, 4 calves are accounted for. Total value Rs. 20.

The total income is tabulated as follows :—

| | RS. | A. | P. |
|---|---|---|---|
| 2,390 Madras measures of milk at As. 6 per measure ... ... .. ... ... ... | 896 | 4 | 0 |
| Four calves at Rs. 5 each ... ... ... ... | 20 | 0 | 0 |
| Total ... | 916 | 4 | 0 |

40. *Statement of accounts.*—On the basis of one cow for the whole period of six years.

| Income. | RS. | A. | P. |
|---|---|---|---|
| Value of cow at the end of period (see depreciation) ... | 30 | 0 | 0 |
| Interest on stock depreciation Reserved Fund ... ... | 15 | 10 | 0 |
| 2,390 Madras measures of milk at As. 6 a measure ... ... | 896 | 4 | 0 |
| Four calves at Rs. 5 each. | 20 | 0 | 0 |
| Balance—Loss ... | 166 | 4 | 0 |
| Total ... | 1,128 | 2 | 0 |

| Expenditure. | RS. | A. | P. |
|---|---|---|---|
| Value of cow at beginning of period ... | 130 | 0 | 0 |
| Interest on capital ... | 46 | 12 | 0 |
| Death-rate during economic period ... | 30 | 0 | 0 |
| Barren cows ... | 25 | 0 | 0 |
| Loss of produce during attacks of disease .. ... | 15 | 0 | 0 |
| Sickness charges for the whole period ... | 5 | 0 | 0 |
| Service or crossing fees ... ... | 7 | 8 | 0 |
| Cost of food ... | 561 | 14 | 0 |
| Cost of labour . . | 136 | 0 | 0 |
| Rent of stalls ... | 36 | 0 | 0 |
| Plant charges ... | 5 | 0 | 0 |
| General contingencies. | 30 | 0 | 0 |
| Total ... | 1,128 | 2 | 0 |

ECONOMICS ON BASIS OF PURE MILK—BUFFALOES.

41. *Purchase price.*—The items under cows have been fully dealt with, therefore, brief notes only are prepared under this section. The economics are the same as for the cows.

The six year basis for five calvings is found to be general rule, and is here adopted. As far as could be ascertained, the great majority of buffaloes are purchased either at the first or second calving.

The average price of input is about Rs. 65. A number of the buffaloes are brought from the northern part of the Presidency, a few are Delhi, while the remainder are termed "Local Breed." Delhis are very few in number.

42. *Depreciation.*—The average slaughter-house value at the close of the economic period is Rs. 20. Therefore the total depreciation is Rs. 45.

*Depreciation scale.*

| | RS. |
|---|---|
| End of first period ... ... ... .. ... ... | 15 |
| End of second period ... ... ... ... ... ... | 10 |
| End of third period ... ... ... ... ... ... | 10 |
| End of fourth period ... .. ... ... .. . | 10 |
| Total ... | 45 |

43. *Interest on capital—*

| | RS. | A. | P. |
|---|---|---|---|
| End of first period Rs. 65 for 15 months at 10 per cent. | 8 | 2 | 0 |
| End of second period Rs. 50 ,, | 6 | 4 | 0 |
| End of third period Rs. 40 ,, | 5 | 0 | 0 |
| End of fourth period Rs. 30 ,, | 3 | 12 | 0 |
| End of fifth period Rs. 20 for 12 months at 10 per cent. | 2 | 0 | 0 |
| Total | 25 | 2 | 0 |

*Interest on stock depreciation Reserve Fund.*

| | RS. | A. | P. |
|---|---|---|---|
| End of second period Rs. 15 for 15 months at 5 per cent. | 0 | 15 | 0 |
| End of third period Rs. 25 ,, | 1 | 9 | 0 |
| End of fourth period Rs. 35 ,, | 2 | 3 | 0 |
| End of fifth period Rs. 45 for 12 months at 5 per cent. | 2 | 4 | 0 |
| Total ... | 6 | 15 | 0 |

44. *Death-rate during economic life.*—This does not appear to differ from that of cows: on that basis the total for the period may be put at Rs. 15.

45. *Barren buffaloes.*—These are in about the same proportion as cows. The loss due to early slaughter is about half of that for cows, Rs. 12-8-0.

46. *Loss during attacks of disease, etc.*—(*a*) *Loss of milk.*—Buffaloes appear to be fairly healthy in Madras, rather more so in this respect than cows. The buffalo seems to be considerably affected by

climatic changes, and while apparently not suffering from any ailment, or perhaps a slight chill, the yield of milk falls. The effect of a cold wind blowing on 13 buffaloes reduced the yield of milk by 5 Madras measures per day.

On the other hand, if buffaloes are not properly protected during the heat of the day, they suffer to some extent.

(*b*) *Impaired efficiency thereafter and* (*c*) *higher depreciation in consequence.*—(*b*) and (*c*) appear to be somewhat insignificant and need not be discussed.

The losses under this head are taken at Rs. 10.

47. *Sickness charges.*—For the whole economic period Rs. 3.

48. *Service or crossing fees.*—Rs. 5.

49. *Feeding charges*—(*a*) *Milking period*—

| | RS. | A | P. | |
|---|---|---|---|---|
| Five months at As. 6 per day ... | 286 | 14 | 0 | For five periods. |
| Three months at As. 5 per day ... ... | 143 | 12 | 0 | |
| Two months at As. 4 per day ... ... | 76 | 4 | 0 | |
| Total for five periods ... | 506 | 15 | 0 | |

The dry periods are found to cost on the average Rs. 4 per month. A special treatment before calving is not much practiced with buffaloes, calving shed rations have not been added. All the dry periods therefore are calculated at a uniform rate.

The cost of food is tabulated thus :—

| | RS. | A. | P. |
|---|---|---|---|
| Five milking periods of 10 months each ... ... | 506 | 14 | 0 |
| Four dry periods of 5 months each and one carrying over period of 2 months .. ... | 88 | 0 | 0 |
| Total | 594 | 14 | 0 |

50. *Cost of labour.* –Buffaloes are usually milked in the yards, therefore the cost of labour is less than with cows. While the cost of labour, in one way, is thus less, the charges for distribution have to be added. Rupees 52 is estimated to cover all expenses under this head.

51. *Rent of stalls.*—Rs. 36 for the five periods.

52. *Plant charges.*—Rs. 5.

53. *General contingencies.*—Rs. 20.

54. *Total cost of producing milk*—

| | RS. | A. | P. |
|---|---|---|---|
| 1. Capital invested ... ... ... ... ... | 65 | 0 | 0 |
| 2. Depreciation ... .. ... ... ... | 45 | 0 | 0 |
| 3. Interest on capital ... ... ... ... | 18 | 3 | 0 |
| 4. Death-rate ... ... ... ... ... | 15 | 0 | 0 |
| 5. Barren buffaloes ... ... ... ... ... | 12 | 8 | 0 |
| 6. Loss of produce during attacks of disease ... | 10 | 0 | 0 |
| 7. Sickness charges ... ... ... ... ... | 3 | 0 | 0 |
| 8. Service or crossing fees ... ... ... | 5 | 0 | 0 |
| 9. Cost of foods ... ... ... ... ... | 594 | 14 | 0 |
| 10. Cost of labour ... ... .. ... ... | 52 | 0 | 0 |

| | | RS. | A. | P. |
|---|---|---|---|---|
| 11. Rent of stalls ... ... ... ... ... | | 36 | 0 | 0 |
| 12. Plant charges ... ... ... ... ... | | 5 | 0 | 0 |
| 13. General contingencies ... ... ... ... | | 20 | 0 | 0 |
| Total ... | | 816 | 9 | 0 |

55. *Value of produce.*—The average of the milk yield was worked out by observation, and by milking a number of animals at various stages of lactation in presence—

| | |
|---|---|
| Average yield per day ... ... | ~~1 and~~ 1½ Madras measures. |
| Lactation period ... ... | 10 months. |
| Price per measure ... ... | As. 6½. |
| Total measures for five periods... | 2,000. |
| Total value . . .. | Rs. 812-8-0. |

56. *Calves.*—The death-rate and calves of no economic value show a total of about 70 per cent. Taking value of three calves at Rs. 3 each, the total equals Rs. 9. Therefore total value of produce is Rs. 821-8-0.

57. Statement of accounts on the basis of one buffalo for the whole period of six years—

| Income. | RS. | A. | P. | Expenditure. | RS. | A. | P. |
|---|---|---|---|---|---|---|---|
| Value of buffalo at the end of period ... | 20 | 0 | 0 | Value of buffalo at the beginning of the period ... ... | 65 | 0 | 0 |
| Interest on stock depreciation Reserve Fund ... | 6 | 15 | 0 | Interest on capital ... | 25 | 2 | 0 |
| 2,000 measures of milk at 6½ annas a measure ... ... | 812 | 8 | 0 | Death-rate ... ... | 15 | 0 | 0 |
| Total value of calves. | 9 | 0 | 0 | Barren buffaloes ... | 12 | 8 | 0 |
| | | | | Loss of produce during attacks of diseases, etc. ... ... . | 10 | 0 | 0 |
| | | | | Sickness charges ... | 3 | 0 | 0 |
| | | | | Service or crossing fee. | 5 | 0 | 0 |
| | | | | Cost of foods .. ... | 594 | 14 | 0 |
| | | | | Cost of labour ... | 52 | 0 | 0 |
| | | | | Rent of stalls ... .. | 36 | 0 | 0 |
| | | | | Plant charges ... .. | 5 | 0 | 0 |
| | | | | General contingencies. | 20 | 0 | 0 |
| | | | | Balance profit ... | 4 | 15 | 0 |
| Total ... | 848 | 7 | 0 | Total ... | 848 | 7 | 0 |

It may be taken under buffaloes, as the gain is so small, that the account just balances. The remarks on contagious diseases under cows also apply here.

58. *Averages—Cows.*—In presenting this economic section based on an average, it is pointed out to avoid misunderstanding, that

the "average" in this particular case should be interpreted with reference to the following points:—

(1) That the number of cows which represent (*a*) average (*b*) average plus and (*c*) average minus, are all combined in that figure.

The relation between the numbers and yield of (*b*) and (*c*) could not be ascertained exactly, but it appeared to be *2* to 3 respectively, while cattle on or near to the average line make up about 50 per cent.

Taking these figures 100 cows contain the following groups:—

| | |
|---|---|
| 50 average. | 30 average minus. |
| 20 average plus. | |

It therefore follows that over 80 per cent of the cows are uneconomic because some uneconomic animals are above the average line in the (*b*) class. Here it may be observed that it is only after an animal has a certain plus average production value that she becomes economic. The plus figure required in Madras is approximately Rs. 33-4-0 per period to balance (see statement of accounts). This does not permit of any reserve fund being formed. In order to provide for losses due to contagious diseases, which have not been charged under cost of production for reasons there stated, to make sufficient net profits to attract capital and give stability to the industry, the profits added to the reserve fund for each period should be substantial. "Averages" raise many points, but the few mentioned will be sufficient for the present purpose.

To make the cow account balance by profits from an increase in the milk yield, an addition of 133 measures on the average during each of the five periods is necessary, or a daily increase during each lactation period of a little over ½ measure.

59. *Averages-Buffaloes.*—If the few Delhi buffaloes are excluded there does not appear to be so much variation amongst buffaloes as cows. At the same time it will be seen that the remarks under cows apply to some extent. It may be observed, however, that the majority of the animals would be classed along or near to the average line. Then there are the average plus and minus groups, but the latter appears to include a smaller percentage than in the case of cows.

60. *General.*—There are in the city a certain number of economic cows and buffaloes, hence it follows that considerable numbers on the lowest average minus scale are a very miserable lot.

When an average lies on the minus economic side, the whole industry is in a very bad way. It should also be noted that the further the average is from the balance economic line, so much the worse of the business.

The herds of the 686 registered dairymen in the city are classified as follows (see table below):—

| | |
|---|---|
| Cows only 5 per cent. | Cows and buffaloes 62 per cent. |
| Buffaloes only 33 per cent | |

It will have been noticed under Part I of this report that the number of buffaloes is greater than that of cows, and it will be seen that those who keep cows only are very few. This no doubt is due to the economic position of the animals on the basis of a pure milk supply—and also to the extent to which buffaloes milk may be adulterated, as shown in Part IV of this report.

61. Table showing the number of dairymen who keep cows only, buffaloes only and mixed herds.

| Division. | Cows only. | Buffaloes only. | Cows and buffaloes. |
|---|---|---|---|
| 1 | 0 | 14 | 7 |
| 2 | 2 | 14 | 9 |
| 3 | 1 | 13 | 7 |
| 4 | 0 | 4 | 8 |
| 5 | 3 | 10 | 26 |
| 6 | 3 | 7 | 25 |
| 7 | 0 | 14 | 52 |
| 8 | 7 | 12 | 29 |
| 9 | 2 | 3 | 22 |
| 10 | 0 | 8 | 3 |
| 11 | 1 | 14 | 23 |
| 12 | 4 | 5 | 33 |
| 13 | 2 | 7 | 14 |
| 14 | 1 | 0 | 0 |
| 15 | 6 | 5 | 11 |
| 16 | 1 | 27 | 19 |
| 17 | 1 | 25 | 48 |
| 18 | 1 | 18 | 41 |
| 19 | 1 | 20 | 22 |
| 20 | 0 | 2 | 16 |
| Total | 36 | 222 | 415 |

62. *Exchanges—Cows and buffaloes.*—The droppings of the animals are generally exchanged for conjee water. Conjee water is the washings from rice, etc., and other household foods. It is collected from door to door in a barrel for the purpose by certain people who deal in it or by the dairymen's own staff. In many yards there are troughs and barrels where this water is stored and fermented for three or four days before use. It is generally fed to buffaloes. Whether the dairyman gains, loses, or balances, in this transaction could not be definitely ascertained. In some instances a part of the droppings is sold in the wet condition at the rate of one cart per Re. 1. The dairymen accuse the dealers in conjee water with adulteration with water, and the dealers accuse the dairymen with adding horse dung and mud to the cow dung.

Conjee water therefore has not been taken into account.

The dried cow dung (bratties) is sold for fuel, the price depending on the value of firewood—the weather (dearer in wet weather) and the quality of the bratties. These bratties are prepared by the dairymen themselves or by the dealers in conjee water.

The average annual sum realized in cash by the sale of manure is too small to be worth taking into account.

## PART IV.

## QUALITY OF MILK.

63. *Percentage butter fat in cow's milk.*—Cow's milk is sold in Madras in three qualities—

(*a*) Pure, milked in the presence of the purchaser.
(*b*) Sold from cans as pure on the statement of the seller.
(*c*) Sold from cans as impure.

*Class A.*—To test the average quality of the milk sold under class *A*, composite samples were taken from the cows milked in presence at the General Hospital. The figures are—

| | | |
|---|---|---|
| 110 cows (morning) | ... ... | 3.4 per cent fat |
| 103 cows (evening) | ... ... | 3·9 per cent ,, |
| Average for day | ... ... ... | 3·65 per cent ,, |

In the case of cows milked from door to door in presence of the purchasers, it was noted that the milkmen draw a quantity from each teat when serving the customers. It is well known that the first drawn milk is not so rich in butter fat as the last milk, but to demonstrate the point, a typical case is recorded.

An Ongole cow about six months calved supplied three customers in the morning, two in the evening, and was milked in presence of each purchaser. A sample was taken from each milking as supplied to the various customers. The dairyman was not aware of the purpose for which the samples were taken, hence he followed his usual practices as regards milking, etc.

The particulars and results are set out in the table below :—

| Customer number. | Distance travelled from cowshed or from last customer. | Particulars of milking. | Quantity sold, Madras measures. | Percentage fat. |
|---|---|---|---|---|
| | | MORNING MILK. | | |
| 1 | 1½ furlongs. | First drawn | ½ | 1·8 |
| 2 | 2 ,, | Second drawn | ¾ | 4·9 |
| 3 | ½ ,, | Third and last | ¼ | 9·0 |
| | | | Average | 4·55 |
| | | EVENING MILK. | | |
| 4 | 1½ furlongs. | First drawn | ¾ | 4 1 |
| 5 | 2 ,, | Second and last | ¼ | 8·8 |
| | | | Average | 5·98 |

NOTE.—In this instance the distance travelled is considered small. Some cows have very long journeys and are shod.

The calf was allowed to suck until the milk dropped before each milking. That adds to the difficulty in obtaining accurate results because the first samples, for example, will vary considerably with the quantity of milk taken by the calf, being richer if comparatively large, and poorer if small.

Many customers who have the cows milked in presence complain of the quality, and undoubtedly, as regards quality, No. 1 customer gets very bad milk, but the fault is not with the dairymen nor cow, but with the practice followed.

Again, complaints of children being upset by milk are common, and there is no doubt that the last drawn milk would have that effect. Even when milk is specially treated for infants, the food varies with the first or second milk, etc., and there is no uniformity. It is quite possible that a child may have No. 1 sample in the morning and No. 5 in the evening, thus a poor diet followed by an excessively rich one cannot but have injurious results.

To get over the difficulty, suppose that a cow supplied four parties, then one teat only should be milked for each, if two, two

teats, if three, milk one teat quite dry, then draw the remainder from another. This suggestion is not free from objections, but it is much better than present practices.

With native cows, and practically all the cross-breds, it is the general practice to put the calf to suck before milking. In cases where a calf dies, the skin is taken off and stuffed with straw. This is put in front of the cow before milking or the head of the calf rubbed along the belly or sides.

When striking an average percentage of fat, the number of cows with stuffed calves must have a considerable effect.

The composite samples taken at the General Hospital to ascertain the percentage fat, had in them the milk of 15 per cent of cows with stuffed calves.

The high percentage of fat in the milk of Indian cows, a point so much commented on, must be favourably influenced by the milking practices followed.

64. *Class B.*—In estimating the quality of this class, 17 samples were taken from retailers in the bazars, etc., who were selling milk as pure. The sampling continued at all times of the day, therefore the average daily figure at the General Hospital is taken as the basis for the percentage of fat in cows' milk. All these analyses are by Dr. W. H. Harrison—Government Agricultural Chemist.

The table shows the division in Madras where the samples were taken, also the price of pure milk per Madras measure and the percentage fat. Samples containing 3 per cent fat and over are taken as pure :—

TABLE I.—*Class B sold from cans as pure.*

| Number of sample. | Division. | Price per Madras measure. | Percentage of fat. |
|---|---|---|---|
| | | ANNAS | |
| 26 ... ... ... | 1 | 6 | 2·8 |
| 31 ... ... ... | 2 | 5 | 1·5 |
| 2 ... ... ... | 4 | 5 | 2·6 |
| 3 ... ... ... | 5 | 6 | 1·5 |
| 5 ... ... ... | 6 | 6 | 2·1 |
| 8 ... ... ... | 8 | 6 | 1·3 |
| 11 ... ... . | 9 | 6 | 3·4 |
| 38 ... ... ... | 10 | 6 | 3·6 |
| 15 ... ... ... | 11 | 5 | 1·9 |
| 17 ... ... ... | 13 | 5 | 2·0 |
| 18 ... ... ... | 13 | 6 | 2·6 |
| 21 ... ... ... | 14 | 6 | 2·9 |
| 42 ... ... ... | 15 | 6 | 1·5 |
| 46 ... ... ... | 16 | 7 | 2·4 |
| 50 ... ... ... | 17 | 6 | 2·1 |
| 55 ... ... ... | 18 | 6 | 1·7 |
| 61 ... ... ... | 19 | 6 | 3·0 |
| 56 ... ... ... | 20 | 6 | |
| Average of samples under three per cent. | ... | | 2·06 |

While the percentage of fat extracted might be calculated from these individual analyses, taking the General Hospital figure as the basis, or after making a deduction from same, and fixing the average at 3 per cent it is not considered advisable to do so at present.

In the first place a considerable amount of further work is required before the average fat contents for the city cattle could be fixed.

65. *Class C.*—Seventeen samples were taken in the same way as under B. On evidence, nearly all the dairymen admit adding water in various quantities. The smallest quantity admitted to be added was about one-eighth of a measure per measure, while the largest admitted watering was equal parts of milk and water.

The analyses are set out on table II below :—

TABLE II.—*Sold from cans as impure.*

Cow's milk.

| Number of sample. | Division. | Price per Madras measure. | Percentage of fat. |
|---|---|---|---|
| | | ANNAS. | |
| 27 ... ... ... | 1 | 4 | 1·7 |
| 30 ... ... ... | 2 | 4 | 1·8 |
| 35 ... ... ... | 3 | 4 | 3·7 |
| 1 ... ... ... | 4 | 4 | |
| 4 ... ... ... | 6 | 4 | 1·1 |
| 6 ... ... ... | 7 | 4 | 1·2 |
| 9 ... ... ... | 8 | 4 | 2·0 |
| 12 ... ... ... | 9 | 4 | 1·8 |
| 39 ... ... ... | 10 | 4 | 3·0 |
| 14 ... ... ... | 11 | 4 | 1·3 |
| 16 ... ... ... | 12 | 4 | 1·0 |
| 22 ... ... ... | 14 | 4 | 1·9 |
| 43 ... ... ... | 15 | 4 | 4·6 |
| 47 ... ... ... | 16 | 4 | 3·3 |
| 51 ... ... ... | 17 | 4 | 2·4 |
| 60 ... ... ... | 19 | 4 | 2·4 |
| 57 ... ... ... | 20 | 4 | 1·8 |
| Average of samples under three per cent ... | | | 1·7 |

NOTE.—In the case of samples with 3 per cent and over, these appeared to be adulterated buffalo milk being sold as cow's. Many others were suspicious.

66. *Buffalo milk.*—The lowest percentage fat in a composite sample milked in presence was 6 per cent and that has been taken as the basis. That sample was from fourteen baffaloes in various stages of lactation, milked after the calf had been put on, and represents a low average.

Buffaloes are not as a rule milked in presence of the purchasers, and therefore the milk is sold in two qualities only—

*A.* Stated to be pure by the seller.

*B.* Impure in various ways (see paragraph 75).

67. *Class A.*—Buffalo milk was sampled as explained under cows. The analyses are set out in Table III.

TABLE III.—*Sold from cans as pure.*

Buffalo milk.

| Number of sample. | Division. | Price per Madras measure. | percentage of fat. |
|---|---|---|---|
| | | ANNAS. | |
| 28 ... ... ... | 1 | 8 | 3·5 |
| 32 ... ... ... | 2 | 6 | — |
| 36 ... ... ... | 3 | 5 | 3·6 |
| 10 ... ... ... | 9 | 8 | 2·9 |
| 40 ... ... ... | 10 | 7 | — |
| 30 ... ... ... | 13 | 6 | 2·4 |
| 24 ... ... ... | 14 | 6 | 2·4 |
| 44 ... ... ... | 15 | 6 | 2·1 |
| 48 ... ... ... | 16 | 6 | — |
| 52 ... ... ... | 17 | 6 | 2·1 |
| 54 ... ... ... | 18 | 6 | 2·7 |
| 63 ... ... ... | 19 | 6 | 3·0 |
| 58 ... ... ... | 20 | 8 | 4 5 |
| | | Average ... | 2·92 |

NOTE.—All these samples are adulterated.

68. *B. Buffalo milk—impure.*—Table IV below sets out the particulars of buffalo milk sold as impure.

TABLE IV.—*Sold from cans as impure.*

Buffalo milk.

| Number of sample. | Division. | Price per Madras measure. | Percentage of fat. |
|---|---|---|---|
| | | ANNAS. | |
| 29 ... ... ... | 1 | 5 | 2·8 |
| 33 ... ... ... | 2 | 5 | — |
| 37 ... ... ... | 3 | 4 | 2·1 |
| 7 ... ... ... | 7 | 4 | 3·2 |
| 25 ... ... ... | 9 | 5 | 2·7 |
| 13 ... ... ... | 11 | 4 | 2·1 |
| 19 ... ... ... | 13 | 4 | 1 7 |
| 23 ... ... ... | 14 | 5 | 2·2 |
| 45 ... ... ... | 15 | 4 | 1·5 |
| 49 ... ... ... | 16 | 4 | 2·4 |
| 53 ... ... ... | 17 | 5 | |
| 62 ... ... ... | 19 | 4 | 2·1 |
| 59 ... ... ... | 20 | 6 | 2·1 |
| | | Average ... | 2·26 |

NOTE.—All these samples are adulterated.

It will be observed that a few blank results appear in the tables. That is due to breakage, etc., and to the rejection of samples which were very abnormal, and could not possibly represent the class under which the milk was being offered for sale.

In order to get as reliable an average as possible, the divisions were not sampled in any order, and that accounts for the absence

of consecutive numbers of samples when the tables are prepared by divisions.

It may be observed that buffalo give their milk quite freely without the calf, if always milked at the same place, food given, and the udder tickled with the fingers until the milk drops. Usually a boy or a girl does the tickling in advance of the milkers.

When a calf is put to the buffalo before milking, the same calf is generally used for two or three. These remarks account for the fact that one never sees stuffed buffalo calf skins.

69. *Methods of adulteration.*—The butter fat in milk may be reduced in several ways:—

(*a*) By adding water.
(*b*) Abstracting cream.
(*c*) By adding skim milk.
(*d*) By various combinations of these.

There is no doubt that all of these methods are largely practised, but the details hardly fall within the scope of this report.

70. *Average quality of the milk.*—In order to get a general idea of the quality of the milk as sold from bazaars in cans, the following table has been prepared. In the case of cow's milk, all samples under *B* and *C* showing 3 per cent fat and over are excluded, and the average struck from the remainder. The average for pure milk is thus taken at 3 per cent so as to be on the low side, and thus avoid overstating the deficiency in fat.

With buffalo milk, the average fat content has been taken at 6 per cent for the above reason.

TABLE I.—*Cow's milk.*

| | Average percentage butter fat. | Percentage deficiency of fat. |
|---|---|---|
| Class B.—Sold from cans as pure ... | 2·06 | 32 |
| Class C.—Sold from cans as impure. | 1·70 | 44 |

TABLE II.—*Buffalo milk.*

| | | |
|---|---|---|
| Class A.—Sold from cans as pure ... | 2·92 | 52 |
| Class B.—Sold from cans as impure. | 2·26 | 63 |

There seems to be some systematic method of adulteration, since the average fat content of the impure milk, both cow and buffalo, is under that of the samples sold as pure.

## PART V.

## ECONOMICS ON THE BASIS OF ADULTERATION AND NOTES ON ADULTERATION.

### Cow's milk.

71. *Notes on adulteration.*—That milk in Madras is adulterated is quite freely admitted by the dairymen themselves, and that practice is stated to be resorted to in order to be able to make a living. Nearly all the dairymen say that it is not possible to get a paying return for pure milk, because consumers must have a large quantity at a small price.

From the evidence the amount of adulteration varies with the kind of customer. For example, dairymen say that if too much water is added respectable people will not buy. As far as could be observed, cow's milk not milked in presence does not undergo any treatment before sale except adulteration with water, and the addition of adulterated buffalo milk in larger or smaller quantities.

Many consumers assert that, even when the cow is milked in presence, it frequently happens that the milk is adulterated with water. When the dairymen have a vessel of water for washing the udder, they may unseen put some into the milk can. It is also suggested that some carry water in a leather water bottle concealed under the cloth and adulterate the milk during milking.

The dairymen look on milking the cow in the presence of the purchaser as a certain amount of injustice, and no doubt this lessens his profits.

72. *Percentage sold as A, B, C.*—It has been estimated that 70 per cent of the milk is sold pure and milked in presence of the consumers or their agents.

Of the remaining 30 per cent, about 20 per cent is sold mixed with buffalo milk and water, and passed off as cow's milk—while 10 per cent is sold as cow's milk, but adulterated with water.

This last is intended for the children of parents who are regular small customers, but who cannot afford to have the cow milked in presence.

73. *Gain by adulteration.*—The adulteration practised is a distinct gain, and varies very considerably in the different divisions.

When all is taken into account, the gain during the five lactation periods is not less than Rs. 75 per cow on the average, or a little over half of the purchase price.

This reduces the loss per average cow for the whole five periods to Rs. 91.

Even when the gain by adulteration is added, the average cow is not economic.

### Buffaloes.

74. *Buffalo milk—Treatment before sale.*—Buffalo milk after milking is in some cases put into vessels which have previously been well heated—the object being to keep the milk sweet and allow part of the cream to come to the surface. After seven hours the cream is skimmed off along with some of the milk. This is boiled, converted into curds, then churned for butter, with buttermilk as a by-product.

The idea underlying these operations is to obtain ghee and skim milk in a sweet state which, after adulteration with water, may be passed as cow's milk.

When such practices are followed the buffaloes are milked at 9 or 10 o'clock in the morning and about the same hour in the evening. Thus the evening milk is sold in the morning and the morning milk in the evening.

75. *Percentage sold as A, B.*—The quantity sold as pure class A is about 60 per cent. This is partly consumed by coffee hotels, and partly by the better class customers. Of coffee hotels there are eleven first, nineteen second and fifty-seven third class in the city.

Coffee hotel owners and several of the general public are fairly good judges of milk, and these get a rather better quality than is sold in the bazaars.

Some of the coffee hotels have a lactometer for testing, and if the reading is considered unsatisfactory, the milk is rejected or the price reduced. A number of coffee hotel owners exercise a certain amount of supervision to insure a pure supply as far as possible.

About 15 per cent of buffalo milk is adulterated with water and passed off as cow's milk.

About 10 per cent of buffalo milk is adulterated with water, mixed with cow's milk, and sold as cow's milk.

Fifteen per cent is disposed of as impure buffalo milk.

The percentage of milk from which part of the fat is extracted could not be approximately ascertained, but there is no doubt that that practice applies to all the above grades to a considerable extent.

76. *Gain by adulteration.*—From the practices followed, it will be seen that all the forms of adulteration and various combinations of these are adopted with buffalo milk. This makes an estimation of the gain all the more difficult, but there is no doubt that it is substantial.

After giving due weight to all the factors that influence the figure, the gain by adulteration and abstracting cream is not less than Rs. 250 over the five lactation periods.

When a buffalo is in milk, the dairymen admit making a profit which is stated to be Rs. 3 to Rs. 5 per month. One may be certain that the profit admitted is within the actual balance.

77. *General note.*—It has previously been observed that very few dairymen keep cows only, and the reasons why are quite apparent. Taking the cattle in Madras belonging to the professional dairymen, there are two buffaloes to every cow. After adding the gain by adulteration of cow's milk to the cow account, there still remains a balance loss of Rs. 91 over the five lactation periods. With a buffalo for the five periods, the gain by adulteration is Rs. 250. In the case of a small herd, say two buffaloes and one cow, the net gain over the five periods is Rs. 409. It must be mentioned that the very uncertain and unestimated figure, deaths during epidemics, has still to be deducted; therefore, that profit figure is above the truth. At the same time it may be noted that the gain by adulteration is estimated on the lowest scale.

Most of the dairymen are in a small way and do the greater part of the work themselves. Under these circumstances, the larger portion of the wages earned may be looked on as part of the living.

While that is so, it must be clearly understood that the wages are an actual part of the cost of production, because if the dairyman did not work for himself, he could earn wages in other ways.

78. *Standard of living.*—The general standard of living amongst the dairymen was noted during the inspections, and there is no doubt that it is on a pretty low scale. Most of them have followed parents in the same business, and are in the trade purely as a matter of what is termed "luck."

There is a general impression amongst them that as their work demands early and late hours, it is necessary to consume a

considerable amount of toddy, etc., so as frequently to have "A day's delight." This, no doubt, accounts to some extent for their rather poor condition.

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## PART VI.

### QUANTITY OF MILK PRODUCED IN THE CITY.

79. *Quantity brought from villages.*—The total quantity of milk produced per day in the city is difficult to arrive at. In the first place there are quite a number of private owners who keep a cow for their own use. These cows are not registered. Amongst this class are the largest consumers of milk per head per day.

Of the total number of registered cows, one quarter is estimated as dry on the yearly average. This small percentage of dry animals is accounted for by the system frequently adopted of sending the dry cows to the country until the next calving.

Taking the number of registered cows at 1,473, of which one-quarter are dry, that leaves a total of 1,105 in milk, producing 2,210 Madras measures per day.

The hospitals consume about 540 measures per day, and have the cows milked in presence. That leaves 1,670 measures for the general public.

80. *The Fort Dairy.*—The milk supply of the city is occasionally augmented by a surplus from the Fort dairy. This dairy is not registered, therefore the stock is not included in the calculations.

The cattle are as follows:—

| | | |
|---|---|---|
| *Cows.*—Ongole ... ... ... ... ... | | 40 |
| Delhi ... ... ... ... ... | | 2 |
| Cross bred ... ... ... ... ... | | 3 |
| | Total ... | 45 |
| *Buffaloes.*—Delhi ... ... ... ... ... | | 11 |
| Northern and local breeds ... ... | | 69 |
| | Total ... | 80 |

The cows and buffaloes when dry are kept until the next calving, thus the economic life of these animals is about the same as described above.

This dairyman leases the grazing ground attached to the Fort, and also what is known as the Island Grounds.

The stock is the private property of the dairyman, and the dairy is carried on to supply the troops.

From the dairy, the daily issue to the garrison is about 200 lb. of cow's milk at 5½ annas per Madras measure, and 40 lb. of butter at Re. 1 per pound.

The buffalo milk is separated, the cream converted into butter, and the skim milk sold to outside customers at the rate of 2½ annas per Madras measure.

At certain seasons a surplus of cow's milk is also disposed of. There is no difficulty in selling the surplus, except for a short time during the rainy or cold weather.

Since the surplus varies much, and as milk is a very perishable food, it can hardly be reckoned as a part of the city daily supply.

*Cost of feeding the herd.*—Taking cows and buffaloes together both in milk and dry, the total cost of foods per day during May was as follows:—

| | RS. |
|---|---|
| Straw ... ... ... ... ... ... ... | 20 |
| Cake ... ... ... ... ... ... ... | 15 |
| Bran and grain husk ... ... ... ... | 20 |
| Total ... | 55 |

Although this dairy is not considered to contribute towards the supply, it could not be passed over without remarks of general interest.

81. *Buffalo milk.*—The registered number of buffaloes is 2,944, and it is estimated that one-sixth of these are dry. The small proportion of dry to milk animals is accounted for by the fact that many of the dry ones are sent to the villages to be kept until the next calving.

Taking the yield on the average at 1⅓ measure per day the total produce is 3,272 measures. In addition to that, about 350 measures are brought into the city from adjoining villages.

A considerable quantity of buffalo milk is consumed in the coffee hotels and in the sweetmeat bazaars.

82. *Total production of milk per day.*—The total quantity of milk produced in the city per day and brought in may be stated as follows:—

| | | |
|---|---|---|
| Cow's milk ... ... ... | 2,210 | Madras measures. |
| Buffalo milk ... ... ... | 3,272 | ,, |
| From villages ... ... | 350 | ,, |
| Total ... | 5,832 | ,, |

From the remarks above, it will be noted that this total is subject to certain deductions before the amount actually available for consumption as milk by the general public can be arrived at. If no deduction is made, the total estimated is above the truth and represents the maximum amount available for what may be described as the city population who live in the streets. The population of the city of Madras is 518,660. From these figures it will be seen how very inadequate the supply is.

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## PART VII.

### CATTLE-BREEDING.

83. *Cows.*—As regards cattle-breeding, nothing systematic is being done in the city of Madras. Sub-breeding or breeding from very closely related animals is practised. This, however, is no

part of any scheme, but is the result of carelessness or want of thought. For example, it very frequently happens that a bull serves his own progeny, for at least one generation and in some cases for two. Such practices as practised lower the value of the animals from every point of view.

Of the bulls inspected, none were pure for any particular breed. There are to be seen the grades where the Jersey and the Ayrshirs, etc., characters are well marked, also the grades where the characters of the Indian cattle are most in evidence. Indeed it is very often not possible to tell what the crosses are. A few are fair animals, but generally they are a non-descript poor lot from a breeding point of view.

One dairyman stated that the first English bulls were brought to Madras over fifty years ago, and there are indications that that is correct.

Bulls and cows have been imported from time to time. This does not appear to have been a part of any organized scheme, but rather a side line of something else. In recent years, a number of Jersey bulls have been imported from Australia, usually being shipped along with horses.

The bulls imported from Great Britain and Australia have remained fairly healthy after being acclimatized to some extent, but the loss seems to have been about 30 per cent during the first two years after landing.

Cows imported from these countries have been subject to a very heavy mortality, and in many cases all the animals died. Young heifers that survived generally died off about the first calving.

It seems that rinderpest, foot and mouth, and what is described by the general term 'Fever'' were the main causes of these high death rates amongst females. The term fever, from its rather general application appears to refer to several diseases. The influence of these imported bulls on the cross cows in the city has been considerable. Any cow that shows the slightest trace of what is termed "foreign blood" is said to be "cross-bred" by the dairymen.

There is no doubt that several animals, even although direct evidence is not available from appearances, have in them some foreign blood.

The cross-bred cows are much more highly valued by the dairymen than the native breeds, and few are inclined to part with this class of stock. It is found that not only do they give more milk per day, but also that the lactation period is longer; they also calve at an earlier age and breed more regularly.

The great care with which the heifer calves are reared when compared with those from native breeds, shows without doubt how much such animals are in favour. Again, dairymen say that it is better to pay Rs. 5 for the service of a cross-bred bull than Re. 1 for, say, a pure Ongole. A few of the bulls from the better cross-bred cows are fairly well reared in the hope of being sold or used as a seed bull, but excepting these, bull calves are rather badly reared, and looked on rather as part of the means for getting the milk from the cow. The heifer calves are reared with a view to bringing them into the herd later on.

Generally speaking, the dairymen have got a fairly good grasp of the proper treatment of this cross-bred class of stock. They say that cross-breds are not so hardy as the native cattle, and therefore require more care and better feeding, especially in the rearing, more protection from the sun, more general attention, etc.

Native cattle are generally Ongoles, but it could not be ascertained what percentages of these are put to Ongole and cross-bred bulls, respectively. These cows are generally brought in from the Ongole and other tracts by dealers who resell to the dairymen.

The heifer calves from good milkers are well reared, but those from the poorer milkers are badly managed. Nearly all the bull calves have to do with very little.

The best of the heifer calves are kept for the herd, while the remainder and the bull calves are disposed of when the cow goes dry.

84. *General.*—The principal movement of stock is between Madras and the Ongole district. This is accounted for by the dairymen in Madras having a preference for the Ongole among the native breeds. Quite a large number of dairymen send their dry cows to the Ongole district to be kept until the next calving. The usual charge for keeping dry cows is Rs. 5 per month, and the dairymen consider that dry stock should be sumptuously fed for that sum. It is also thought that the stay in the country enables the animals to recuperate their health and that they will remain in better form during the lactation period. Some cows are in calf before leaving the city, and those that are not are covered in the country districts.

It also appears that cattle which cannot be got in calf when in the city become fruitful after a few months in the country. In some instances it is the custom under the last cited case for the dairymen to give a new turban-cloth in addition to the cash payments when the cow is brought back in calf.

It is rather significant that none of the dairymen, so far as could be ascertained, send cross-bred stock to the country until the next calving. There is a general fear to trust these in the hands of strangers.

85. *Buffaloes.*—Nothing is known of the milking strain from which the bulls in the city or in the country are descended. No breeding is done on organized lines. While the buffaloes are fairly well looked after, the calves are much neglected. Few of the dairymen rear young stock for the herd. As already mentioned, buffaloes give their milk without the calf, and, on that account, the calves are looked on as a nuisance and practically starved to death. Calves of four and five months old are little heavier than when they were born. Undoubtedly the buffalo calves are the most neglected class of stock in the city. It is well known that they cannot stand the sun, and one finds that they are usually tied in the sunniest part of the yard. The dairymen appear to systematically use these methods to kill of the young stock. Those that survive are generally sold to ryots in the country districts..

A number of the dry buffalo cows are kept in the city until the next calving, while a considerable proportion are sent to the country.

The charges for keep in the country vary very much, twelve annas per month being the lowest mentioned. It seems that when they are sent to the districts on this scale, they are merely looked on as scavengers and get practically no food except what is picked up. After such treatment buffaloes return to the city at the commencement of the next milking period in very poor condition and consequently milk rather badly.

For what is considered good feeding Rs. 3 to Rs. 4 per month is the usual charge. Most of the dairymen prefer to pay fairly well to have their buffaloes properly looked after during the dry period. Many are sent to the villages around Madras and some to the Ongole district.

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## PART VIII.

86. *Concluding general note.*—From what has gone before in other parts, it will be quite apparent that milk production in the City of Madras is in a very unsatisfactory condition. There is nothing to show that the industry ever was efficient, indeed all the general evidence is on the other side. It would be somewhat unfair to fix the whole blame on the Madras dairyman, as other causes beyond his control have been operating against him.

As regards cows, he has had to purchase the best animals that the country can produce, and even the best are bad from the dairyman's point of view. The cattle have been bred with the sole object of producing draft animals, the milk yield being a very secondary consideration. There is no doubt that the continued indifference to the milk yield has impeded improvements in that direction, without any corresponding gain towards draft qualities (Ongole cattle).

Very little attention is paid to the milking qualities of buffaloes, and here again the dairymen are handicapped.

The fact that the dairymen are confined to the city prevents them from breeding all their own stock, and grading them up with a special view towards milk production. The location of practically all the milk cattle within the city appears to be due to the rapid changes which milk undergoes in a tropical climate—thereby making transport from outside impossible under the existing practices. In countries where town dairying succeeds, there are a number of breeders and dairymen in the districts who breed surplus stock specially suited to the dairymen's requirements. The position of the Madras dairymen with all his faults is seen to be an impossible one. He cannot breed the special stock required, nor do any do this for him. One or other of these two conditions is quite essential before one can look forward with any hope for improvements.

From this condition of things, combined with the fact that there are no penalties for adulteration, also that the public demand a large measure for a small sum, springs the whole system of systematic adulteration and fraud.

There is no question that were it not for the adulteration practised, the dairymen could not live.

When all is taken into account, what surprises me is that any have remained in the dairy trade, as there seems to be better opportunities in almost any other direction.

Madras being a seaport, cows and bulls have been landed there from time to time mainly as a side line; this has given rise to the cross-bred cattle in the city today. The use that the dairymen have made of these, rather inclines me to the view that, if part of the milk supply has been in the hands of men in the districts who breed their own cattle, such dairymen would to some extent have found a way out of the difficulty by grading up for milk. Again, the surplus stock could have been sold to the dairymen in the city at remunerative prices to the breeder, and at the same time economic value to the purchaser.

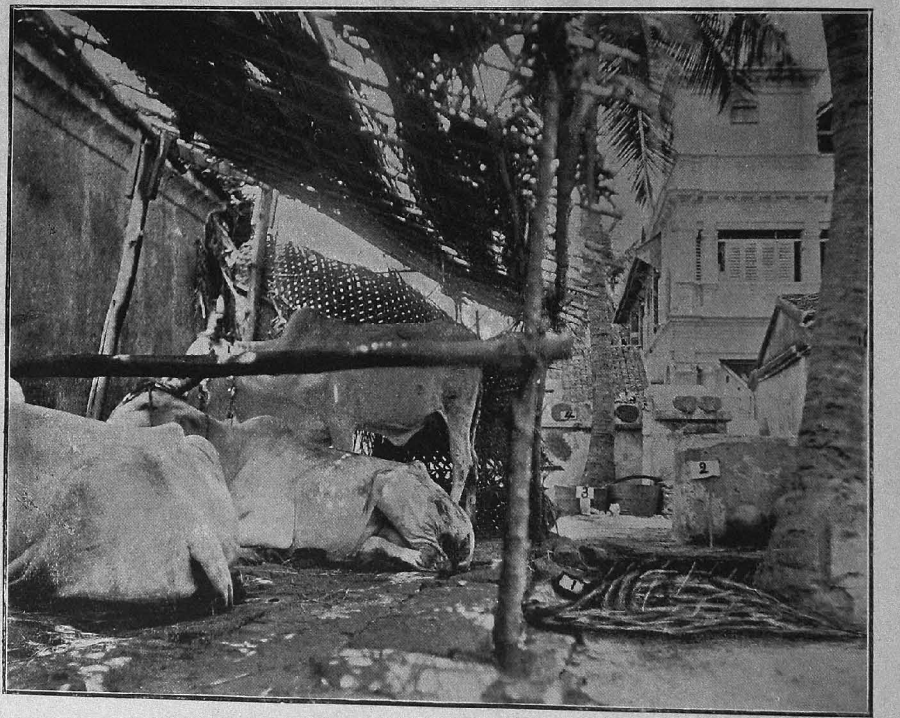
I take the general view that it is possible to do much to put the dairying in the city on better footing, but problems of this kind require a good deal of working out.

It is fairly easy to see that something requires to be done, but devising the lines on which the necessary improvements may be effectively made is another matter.

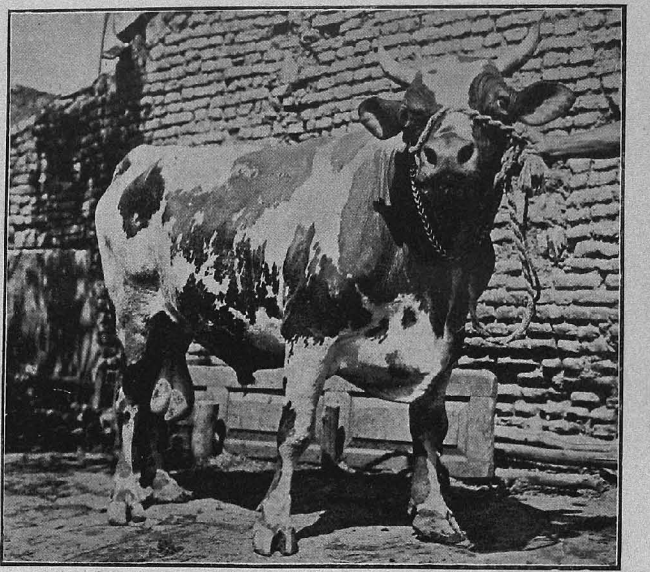
Seeing that all classes value milk and milk products, there is room for much development without danger of glutting the market. Indeed it appears that with an improved milk supply, one can look forward to a raising of the standard of public health.

If milk is to be supplied unadulterated, then, to make production economic, (*a*) the price must be increased, or (*b*) better business methods introduced, and good milking stock bred. If the price is increased, comparatively few will be able to afford it, thus this remedy may be dismissed. With better business methods and an improved strain of dairy stock, there is every hope that pure milk can be supplied at present prices, and at the same time leave a profit to the dairymen.

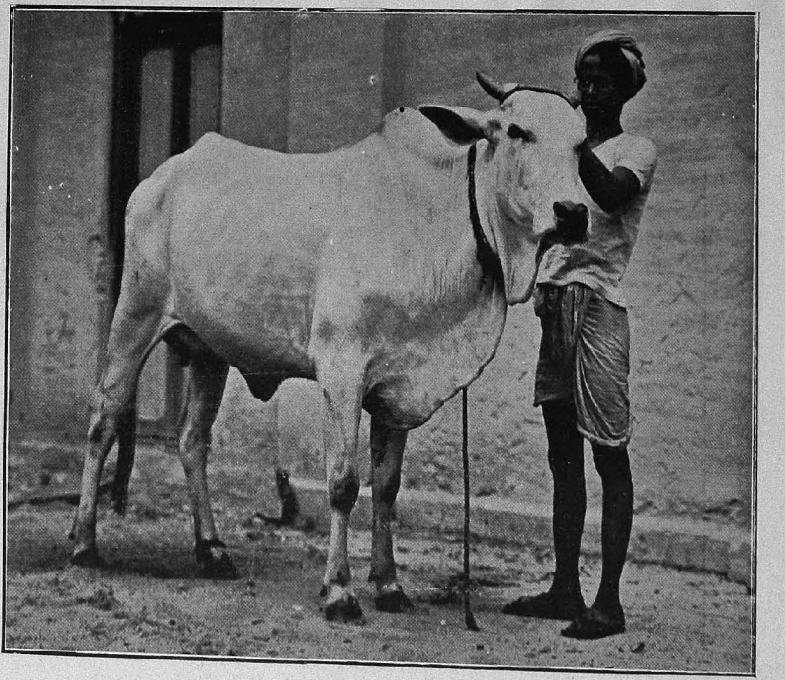
*Note of acknowledgment.*—During the enquiry, the acting Health Officer and his subordinates rendered invaluable service, and I herewith express my thanks and indebtedness to them.



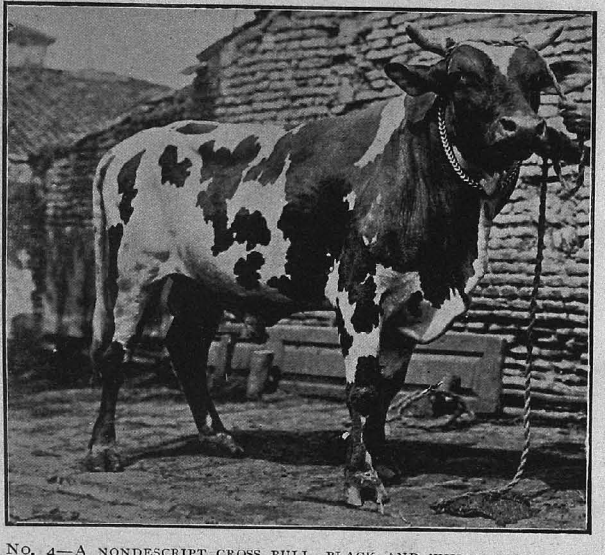

No. 1.—A Madras cattle yard. (1) Heap of manure in fore ground; (2) Well; (3) Tubs used for conjee water; (4) Latrine—Batties being dried on the wall. The other details should be noted.



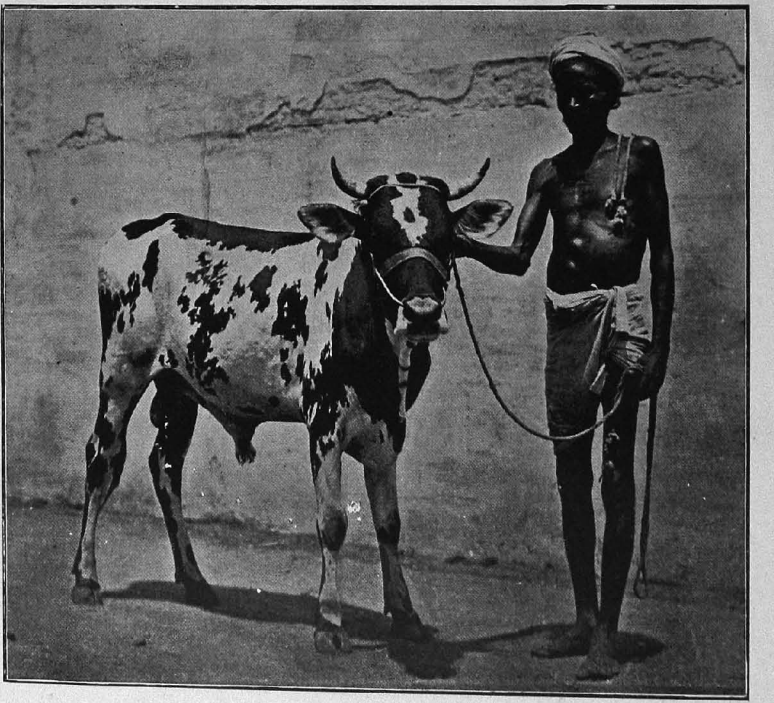
No. 2—Ayrshire Jersey cross bull, brown and white, ten years old. This animal shows traces of both of these breeds, but he appears to have a little native blood also. Madras dairymen consider him to be a very good animal.



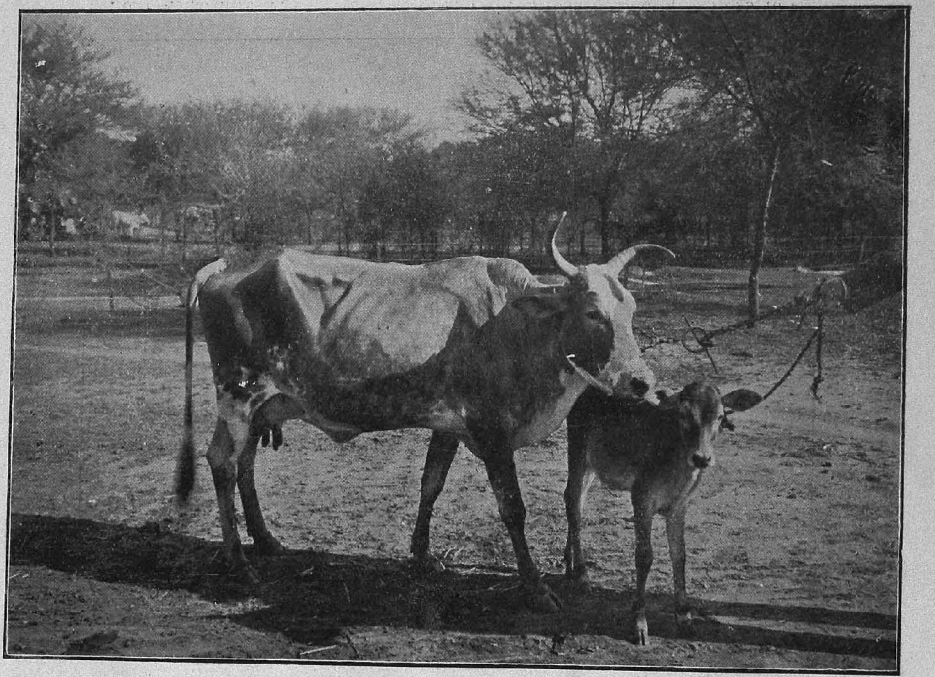
No. 3—Ongole cow.



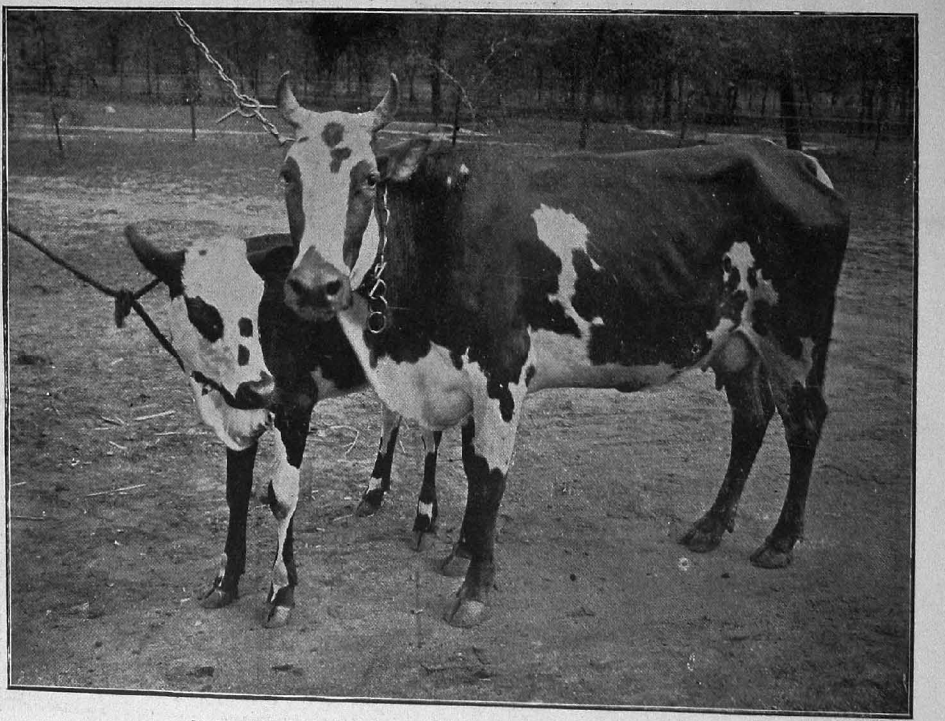
No. 4—A NONDESCRIPT CROSS BULL, BLACK AND WHITE, FIVE YEARS OLD, SUPPOSED TO BE THE PRODUCE OF BULL No. 2 AND A CROSS-BRED COW.



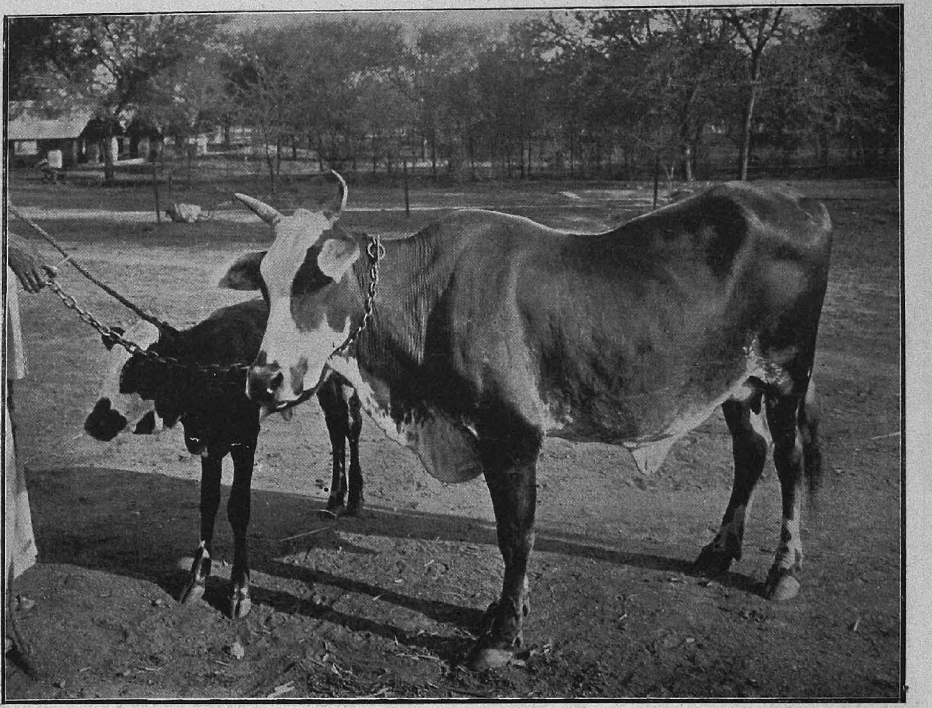
No. 5—A NONDESCRIPT CROSS BULL, BLACK AND WHITE, FOUR YEARS OLD, SUPPOSED TO BE THE PRODUCE OF BULL No. 2 AND A CROSS-BRED COW.



No. 6—Jersey Ongole cross cow.

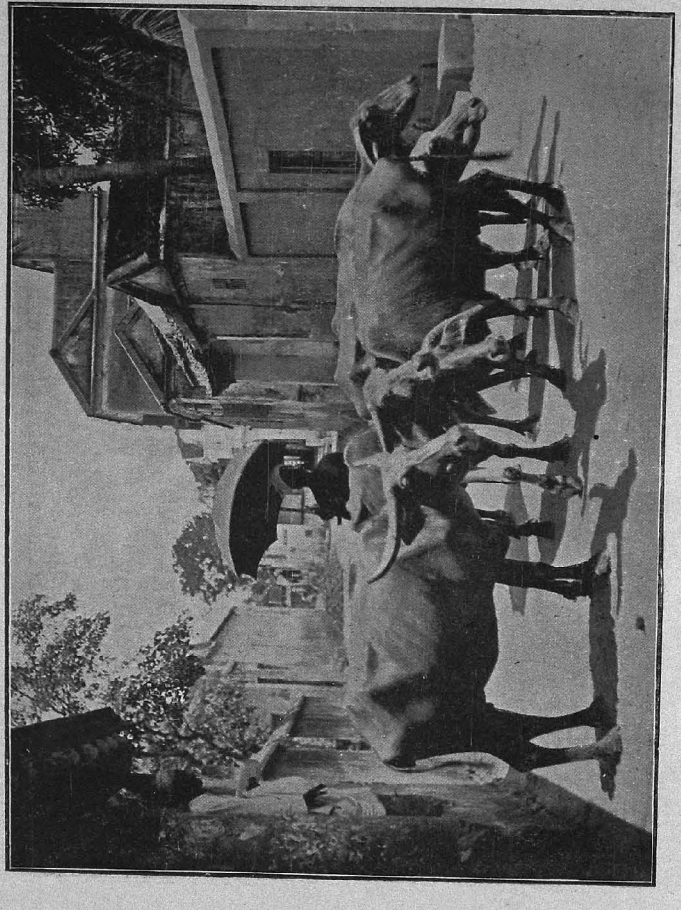


No. 7—Heifer. The produce of 2 and 6 (Illustration list)
Ayrshire characters fairly well marked.



No. 8—Cow. Three-quarters Jersey Ongole.

No. 9—Nondescript cross cow.



No. 10—A GROUP OF TYPICAL BUFFALOES.