

## The Coimbatore Agricultural College Dairy.

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**Introduction.** A small dairy is attached to the Coimbatore Agricultural College. It functions as an educational medium for imparting first hand knowledge on breeding, feeding and general management of cattle together with the production and handling of milk and its products. In addition, it serves as a unit for the supply of dairy products to limited customers.

**The Dairy Herd.** The College dairy herd consists of about 25 to 30 cows, mostly cross-breds and a few Sindhis headed by a Sindhi bull. The animals are the remnants of the cross-breeding experiments that were started a few years back with Ayrshire bulls. Since the winding up of this experiment owing to the gradual degeneration of the crosses, the policy has been to breed back to the Sindhi, to enhance the percentage of indigenous blood in the resulting crosses. The results are fairly satisfactory in that some of them give better yield than the Sindhis. The following are the details of the dairy herds:

<i>Particulars.</i>	<i>1939-40.</i>	<i>1940-41.</i>
1. Average number of cows maintained	28.6	25.4
2. Average number of milch cows	19.8	17.4
3. Total milk yield for the year	118,047 lb.	115,058 lb.
4. Average yield of milk per cow per day	16.1 ..	18.0 ..
5. Average yield overall in the herd	11.1 ..	12.3 ..

**The Dairy Equipment.** There are four cattle stalls one for the milch cows, another for the dry, a third for the pregnant cows and a small one for the calves, all fenced and provided with water taps. There is a milking shed to milk about 50 animals at a time. There is a dairy building to handle and process milk and milk products. There is a feed store with soaking troughs in them. There are about 16 acres of paddocks to serve as grazing and exercising ground for the cattle. Three milk-men, two men to work in the yard, one calf boy, and three men in the dairy are employed.

**Daily routine.** The work starts at four in the morning. Milch animals are brought to the milking shed and are tied in their respective places. Their hind quarters are washed and groomed. Milking commences at five and lasts till six. They are then fed with half the concentrates and then let out for grazing. Dry cows are groomed as well, fed and let out for grazing. The bull and the suckling calves are exercised separately. The animals are brought back at 11 and fed with a third of the bulky fodder in the stalls. Calves are fed on *Kanji*. The noon feeding of the concentrates is done between 2 and 3 and the evening ration of bulky fodder—the balance two thirds—put in the troughs by 5 P. M. Sick animals are taken to the veterinary hospital whenever required. Milking is done twice, once in the

morning before feeding and once in the evening after feeding. Calves are fed immediately after milking. The milk is then distributed to customers. The surplus is converted into butter.

**What students learn.** Students take part in all items of work connected with cattle management and dairy practice. In brief, they learn about breeding, feeding and general management of cattle.

**Breeding.** General principles as to the method of breeding, the interval between the breeding seasons, types of breeding, like cross-breeding, back-crossing and grading, are demonstrated here. The student gains practical knowledge regarding the aspects of cattle breeding, such as, cross-breeding, back crossing and pure line breeding. Incidentally he learns that the selection of the bull is based on the following:—that the animal is of proper size with a pleasing appearance, is active and energetic with a compact frame, a wide chest and well sprung ribs, a good set of legs under a well developed barrel; that he is backed up by a line of good ancestors; that his half sisters have done uniformly well; that he is neither under nor over aged. Records reveal to him that no bull is allowed to serve more than about 50 to 60 cows per year.

As regards the onset of oestrus he sees some difference between that prevailing in the village and that in the farm. Conditions prevailing in the farm are more of a uniform type with regard to the feeding, housing and general management that to a certain extent they adapt themselves to this artificial method rather than be season bound. Thus very definite breeding seasons are not observed in the farm as in the village though there is some concentration between November and December. Whereas the village cow is subjected to the vicissitudes of the seasonal variations and the resultant environmental conditions, that of the cow in the farm is more uniform and in consequence the attendant changes are less marked. To a certain extent the regulations of the calving seasons is of utmost importance in a commercial world where seasons of demand have to be studied and attended to promptly. In the farm the breeding and the calving seasons have been regulated to a certain extent so that a uniformity of production is obtained throughout the year as will be seen from the 16 years average noted below:—

Month.	No. of calvings.	Month.	No of calvings.	Month.	No. of calvings.
December	2.9	May	1.6	October	1.4
November	1.9	September	1.6	January	1.4
June	1.7	August	1.5	April	1.3
July	1.7	February	1.5	March	1.0

**Service.** The cows invariably come to heat six to eight weeks after calving. Most of the cows that come to heat within that period are served, though in the case of some heavy yielders the service is slightly delayed lest it should be difficult to dry them off at advanced pregnancy. The general signs of heat in a cow are reduction in milk yield, cessation of

rumination, general restlessness, bellowing, frequent urination, switching of the tail, trying to mount over other cows and trying to be mounted over by other cows and discharge from the genitals. Immediately, the cow is taken to the bull and got served. After service the animal shows a tendency to strain and arch its back. A dash of cold water is directed against the genitals and a pat given on the back of the animal to prevent its arching the back. The animal is tied in the stall for sometime and given bran mash only. In case of ineffective service the heat generally recurs on the 21st day.

**Feeding.** A rational system of feeding is in vogue on the farm. Feed is varied on the basis of the requirements of the various classes of cattle. This is based on the principle that the requirements of the calf is for its rapid growth, that of the dry cow for its maintenance only, that of the pregnant cow for its maintenance as well as to the growth and development of the foetus inside and that of the milch cow for its maintenance and the production of milk.

The feed requirements of the animals are partly met by concentrates and partly by bulky fodder. The former consist of groundnut cake, cotton seed, rice bran and *dhall* husk. Bulky fodders include fodder *cholam*, fodder maize, Guinea grass and lucerne. Food adjuncts included are salt and mineral mixture. In addition, the cattle get a few hours of grazing but what little they get is restricted to the months from October to January. Care is taken to see that the animals are fed at regular intervals with balanced diets containing the proper nutrients such as proteins, carbohydrates, fats, minerals and vitamins in the right form and quantity; that there is succulence and varieties in the rations, not to speak of cheapness and economy. The quota of each animal is divided and fed twice or thrice as the case may be. Individual attention is given with regard to feeding. Cattlefoods are soaked in the respective feed troughs after the quota of each is measured out.

**Rearing of calves.** The calves at birth are weaned and removed from the dam. They are then rubbed dry, the naval cord is cut one inch below the naval ligatured and painted with tincture-iodine to prevent naval infection. They are then taught to drink by pressing their heads down into a bucket containing the required quantity of milk and inserting one finger dipped in milk into its mouth. The calf begins to lick the finger and learns to drink. While in the act, it automatically sucks in the milk in the bucket. Gradually the calf learns to drink from the bucket without help. Subsequently the time of feeding is regularised, morning, noon and evening. The quantity given varies slightly from the first to the seventh day. To start with the calf gets 5 to 6 pounds of milk every day, fed thrice a day. Gradually this is raised to 8 pounds a day i. e. three pounds in the morning, two pounds in the noon and three pounds in the evening. The average weight of a calf at birth is between 50 and 60 lb. and a ration of one pound of milk per day for every ten pounds live weight of the calf has been found to

be reasonable. By about the second week, it gets about 8 lb. a day and this quantity is continued to be fed till the end of the month. From about the third week the calf is trained to lick wheat bran and bite green blades of grass. Immediately after the feeding of milk a small quantity of wheat bran is smeared over its muzzle. It develops a tendency to lick and begins to have a liking for the bran. A sprinkling of bran is placed in the trough in front of the calf which it subsequently learns to lick and eat. In the same trough bits of tender grass are put. Their natural instinct prompts them to bite. The calf is thus initiated to trough feeding. During the first month the calf remains muzzled except at feeding time. This prevents them from licking each other and preventing the formation of hair-balls in their stomach and also prevents them from eating earth, resulting in gastric trouble. From the second and third month the milk is reduced to four pounds i. e. two pounds in the morning and two pounds in the evening but one pound of concentrates, half in the morning and half in the evening is included. In addition, it gets half a pound ragi and quarter pound maize in three pounds of skim milk, as gruel in the noon. Green fodder is fed as much as it would consume. From the fourth to the sixth month milk is reduced to two pounds—one pound in the morning and one pound in the evening, the gruel raised to six pounds and the concentrates, to one and a half pounds. After the sixth month, they get no milk but about one and a half to two pounds of concentrates and liberal quantities of green fodder. The quantity of concentrates are gradually increased so that by the end of the year they would be getting about two to three pounds.

When a yearling, they get about four pounds of concentrates made up of equal quantities of groundnut cake, cotton seed, rice bran and *dhall* husk mixed with two ounces of salt and two ounces of mineral mixture. Good growth and development is attained in about two and a half years, when the animals come to heat. The animal is then served. Provided the service is effective it calves in about 285 days.

**Care of cow in calf.** Two months before calving the pregnant cow is separated from the rest of the animals, is grazed separately and fed on a slightly changed ration of about 4 to 6 lb. of concentrates. Care is taken to see that the feed given has a laxative effect. This is ensured by the incorporation into the mixture of sufficient quantities of wheat bran and providing plenty of succulent fodder. A week before calving the concentrates are gradually reduced and more bran is given in the form of a mash. The bran mash is continued even after three or four days after calving. Subsequently the concentrates are slightly increased. Gradual increase is effected and in ten to fifteen days after calving it gets its normal ration.

**Rations for milch cows.** The proper ration consists in giving a maintenance ration of 2 lb. of concentrates plus a productive ration of 3 lb. of concentrates for every 10 lb. of milk that it gives; that is if a cow gives 10 lb. of milk, it gets 5 lb. For every 10 lb. of milk above this quantity 3 lb. of concentrates are to be added.

**Economy of heavy producers.** The cost of production of milk from cows of different grades differs. Among three cows of practically the same age, size and lactation, that give 10, 20 and 30 lb. respectively, the cost of milk production varies as follow:—

Quantity of milk obtained per day	Concentrates to be given for			Total cost of feed @ 0-0-5 a lb.	Cost per pound of milk.
	Maintenance.	Production of milk.	Total.		
lb.	lb.	lb.	lb.	Rs. as ps	Rs. as ps.
10	2	3	5	0 2 1	0 0 2½
20	2	6	8	0 3 4	0 0 2
30	2	9	11	0 4 7	0 0 1½

It would thus appear that the high yielding cows produce milk cheaper than the low yielding ones.

**Variations in lactation yield.** As the milk yield increases the concentrates are increased. The lactation curve goes on rising from the date of calving to about the 3rd or 4th week; then remains stationary to about the 8th or 12th week and then gradually declines. It will thus be seen that the peak of production is reached within about the 3rd to 8th week and this determined, it has been possible to predict milk yield of the cow for the lactation. There is a natural fall from the 8th to the 12th week onwards. Invariably weaned cows come to heat within that period. Advantage is taken of this and the animals are allowed to be served. Such a practice ensures a fairly regular calving at frequent intervals ranging from 16 months. Further it has the distinct advantage in the economical working of the dairy in that enhanced milk yields are obtained at regular intervals in addition to a calf at an interval not longer than 13 months to 16 months. This practice is in distinct contrast to what obtains in the villages. The villagers serve their cows 8 to 10 months or even one year after calving. They do so because (1) the calves in the villages are allowed to suckle their dams and (2) the people have a mistaken notion that the milk yield goes down immediately after service.

**Advantages of weaning calves.** The advantages of weaning calves are many. It accurately gauges the milk yield of the cow; enables the cow to be milked even after the death of the calves, enables the correct feeding of the calves; prevents the rush and buzzle at milking time; enables clean milking and makes the cow come to heat earlier.

**Advantages of early service after calving.** Getting animals served 2 to 3 months after calving enables them to calve every year, or at slightly longer intervals with the attendant increased flow of milk. The average yield of milk per day of the cow is high and therefore the cost of milk production is lowered. The dry period is lessened. The village cows get served only towards the end of their lactation. The lactation period is unusually long, with the consequent reduction in the daily average. The dry period is very long. The fear that service brings about a reduction in

milk yield is not based on experimental data. In some cases no doubt there is a reduction as a result of the onset of oestrus, but the reduction is gradually made good within a day or two after service. The real fall due to service takes place only five months after conception. The usual decline in milk yield after the third month should not be mistaken for that due to service. The ryot feels that he gets his usual  $1\frac{1}{2}$  to 2 lb. of milk for a very long period but cares little to note at what cost; nor does he foresee the uneconomic dry period. His satisfaction is that he does not need to feed the dry cow. The fact that an ill-fed dry cow shows itself out by a reduced yield in the subsequent lactations also escapes his notice. In the case of a cow served 3 months after calving we get a yearly yield of say 3000 lb. plus a calf; in the case of one served 12 months after calving we get the same yield in two years. The disparity is clear.

**Rations for dry cows.** With the decline in the milk yield the concentrates are reduced from time to time till at last it gets the barest minimum—say 2 to 3 lb. A little over two months before calving the cow if it persists to give milk is dried off as follows:— Concentrates and green fodders are withheld. Only straw is fed. Grazing too is denied. Milking is done only once, subsequently once in alternate days, then once in three days and so on until it gets dried off. After the animal is dried it is gradually given enhanced feed till at last it receives about 4 to 6 lb. of concentrates with wheat bran as the chief constituent. A few days before calving feeding is given as mentioned already.

The dry cow gets a normal ration of 3 lb. of concentrates made up of equal quantities of groundnut cake, cotton seed, rice bran, *dhall* husk, with about 12 to 15 lb. of dry fodder. Two ounces of salt and 2 oz. of mineral mixture (equal parts of extra fine steamed bone-meal and slaked lime) are added to the concentrates. The concentrates are reduced if plenty of grazing is available. If not, it is kept up.

**Rations for breeding bulls.** The breeding bulls are fed on 4 to 6 lb. of concentrates of the composition said above and 15 to 18 lb. dry fodder. During seasons of many services, it gets 6 lb. of concentrates and at other times 4 lb.

<i>Cost of breeding stock:—</i>		Rs.	as.	ps.	per day.
Cows giving 40 lb. milk		0	7	6	..
.. 30 lb. ..		0	6	7	..
.. 20 lb. ..		0	5	5	..
.. 10 lb. ..		0	4	5	..
Dry cow		0	3	2	..
Breeding bull		0	4	9	..
<i>Cost of rearing:—</i>					
Calf upto one year		Rs.	85.		
Heifer upto maturity		Rs.	280.		
A bull upto maturity		Rs.	300.		
A cow from calving to calving		Rs.	145 to 185.		

**Green fodder.** The green fodder for the dairy animals are grown in the Central Farm attached to the Agricultural College. Annual fodders such

as *cholam* and maize, and perennials like lucerne and Guinea grass are cultivated. The annuals are sown in small areas at fortnightly intervals to ensure a regular supply. The daily requirements are cut every day and a judicious mixture of the different feeds in the proportion 20 lb. of *cholam* or maize fodder, 20 lb. of Guinea grass and 10 lb. of lucerne is fed to each animal, to give variety, palatability, succulence and above all proper nutrients. Green grass growing on field bunds are also cut and fed instead of *cholam*, maize or Guinea grass. Cane tops, which are available in the months of December to January are also fed. Occasionally sweet-potato vines, *pillipesara* (*Phaseolus trilobus*) and sunnhemp are also included according to availability. Silage is made of grass or green fodder in seasons of plenty for use during the hot months.

**Housing.** Particular attention is necessary in the construction of proper stalls for housing the cattle, though they may appear to be too costly for an ordinary ryot. In the construction of a cattle stall one has to see to the following. That the animal gets sufficient protection from extremes of climate; that sufficient and convenient accommodation is provided; that the stalls are well lighted and ventilated; that the flooring is impervious, non-slippery, easily cleaned and not cold; that the urine and other washings are drained in proper channels to a distant place from the stalls; that there is sufficient accommodation to move about for feeding and tending cattle and that the surroundings are neat and clean. These are some of the essentials which demand no doubt some money. Thought, care and kindness to the dumb animals are more essential in rearing.

**Dairy.** The dairy practices include milking and the processing of milk and milk products. Milking is done twice. The milk is weighed and filtered. Receipt from each cow is recorded against the respective animals in a milk yield register. By so recording profitable cows are detected, feeding is done economically and reduction in milk yield is found out so that causes may be investigated. Sick animals may be brought to light earlier.

**Disposal of milk.** Milk at body heat is fed to suckling calves. The customers are then supplied. The surplus is then separated in a centrifugal cream separator into about 10 per cent. (by weight) of cream and 90 per cent. of skim milk.

**Preparation of butter.** The cream is heated in a water bath to about 160°F. for about half an hour, then cooled and about 2 to 3 per cent of buttermilk is added, stirred and kept aside for ripening overnight.

The ripened cream kept over night is taken in the morning, an equal amount of cold water is added and churned in a wooden churn. When it just begins to granulate as is indicated by the clearing of the "peep glass" more cold water is added and churned until granules assume the size of *cholam* grains. The butter is washed twice with cold water to free

it of all buttermilk to enhance its keeping quality. Then it is pressed in a butter worker to free it from superfluous water. Then salt at the rate of  $\frac{1}{4}$  ounce per lb. of butter is added and incorporated on the butter worker. It is then packed and preserved in cold storage. The watery buttermilk is fed to poultry. About 5 to  $5\frac{1}{2}$  lb. of butter are obtained from 100 lb. of milk which when melted would yield about  $3\frac{1}{4}$  lb. of ghee. This method of butter making in contrast to the local method has the following advantages. 1. loss of butter is minimised in the working process 2. quality is enhanced, as also keeping quality, 3. time, labour, cost of utensils involved are minimised, 4. fresh skim milk is obtained. The skim milk is partly fed to calves and partly sold to customers. It makes good curds. It may not be so tasty as the one from whole milk but sufficiently rich to produce effective growth and development in children.

**Disposal of Dairy produce.** The main items of sale in the dairy are milk, butter, skim milk and ghee.

It is most economical to sell milk as such, as disposing it off as milk products involves loss as shown below:—

		Loss in sale of milk products.	
1.	100 lb. whole milk at $1\frac{1}{2}$ annas per 1 lb.	Rs. 9 6 0	
2.	100 lb. milk converted into butter and skim milk—5 lb. of butter at Re. 1 per pound	Rs. 5 0 0	
	90 lb. of skim milk at 6 pies per pound	Rs. 2 13 0	
	Total.	Rs. 7 13 0	Rs. 1 9 0
3.	100 lb. of milk converted into ghee and skim milk— $3\frac{3}{4}$ lb. of ghee at 12 annas per lb.	Rs. 2 13 0	
	90 lb. skim milk at 6 pies per lb.	Rs. 2 13 0	
	Total.	Rs. 5 10 0	3 12 0

The other economical ways of disposal of milk are as *koa*, ice cream, and sweetened flavoured cool milk drinks. These are worth a trial.

**Cleanliness in the dairy.** Absolute cleanliness is of vital importance in the dairy compound. Clean stalls, clean cows, clean milk-men and clean vessels ensure a clean and therefore safe food. Cleanliness in the dairy is brought about by the liberal use of water, washing soda, steam and the sun.

**Records.** It is too well known that a business cannot be conducted efficiently without records concerning all transactions as well as production costs. The dairyman who does not maintain a fairly accurate record of the amount of feed given to each cow and the amount of milk produced by it, is not certainly conducting business efficiently. All improvements of the herd by the use of good sires and sound feeding practices are based upon records. The following records are maintained in the College Dairy:—

*Production records.* These enable one to detect economic and un-economic cows and to retain the calves from high yielders, and feeding according to production. Feeding by guess is always wasteful.



*Feed records.* Feed represents 50 to 60 per cent of the total cost of production and hence the importance of maintaining the record. A ration chart is prepared twice a month according to the requirements of the various classes of animals in the College Dairy.

*Breeding and calving records.* Cows should be bred so as to calve according to demands for milk. Every cow should be dried off and got into proper state for her next lactation. Unless the exact breeding date is known some cows may be milked too long while others dried off too soon.

*Health records.* These reveal the various ailments of a particular animal. Inoculations done against contagious diseases are also recorded.

*Sale records.* A record of each transaction provides a valuable reference. Disputes and errors are often avoided. Accurate records create confidence on the part of the buyer and the seller as well. They help in preparing the trading; and profit and loss account.

*Trading, and profit and loss account.* The trading and profit and loss account consists of (1) a direct expenditure and (2) an indirect expenditure. The former includes such items as feed, labour, salary of staff, stores consumed, allowances and presents, transport charges on animals, postage and stationery, repairs to buildings, ice plant and boiler expenses. The latter includes interest on capital, depreciation on buildings, machinery, furniture, loss by sale of cattle, depreciation on animals, death, direction charges, audit fees, leave and pension of officers.

The following figures represent the expenditure and revenue of two years of the College Dairy.

Year.	Direct expenditure.	Indirect expenditure.	Total expenditure.	Revenue.	Loss.
	Rs.	Rs.	Rs.	Rs.	Rs.
1939-40	8,176	3,666	11,842	11,255	587
1940-41	8,364	3,173	11,537	11,074	463

An examination of the various items of expenditure would reveal that all items under the direct expenditure are essential for the efficient working of the concern. A Dairy Manager on Rs. 130 and an Accountant on Rs. 80 have been included in the direct expenditure. A critical examination of the items under the indirect expenditure, however, reveal that out of a total of 3,000 and odd rupees a sum of Rs. 1514 is taken up by such items as, direction charges (part of the pay of the Superintendent) Rs. 442, audit fees Rs. 520, and leave and pension Rs. 552. If we delete this Rs. 1514 or a portion thereof from the total expenditure the situation is changed for the better. The over-head charges can also be reduced on account of the reduction in the size of the herd. The loss is then turned to one of balance if not a gain and the dairy becomes a self supporting concern even while it serves to train students.

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