

THE NATIONAL PLANNING COMMITTEE.
Sub-committee on Animal Husbandry and Dairying.

INTERIM REPORT.

The Sub-Committee on Animal Husbandry and Dairying begato submit the following Report:-

2. The following five gentlemen were first appointed as members of the Sub-Committee:-

Sir Chunilal V.Mehta, K.C.S.I., Bombay (Chairman).

Dr. B.K.Badami, Director of the Veterinary Department, Hyderabad (Secretary).

Mr. E.J.Bruen, Livestock Expert to the Government of Bombay (Poona),

Rao Bahdur M.R.Ramaswami Sivan, Retired Principal of the Agricultural College, Coimbatore,

and Mr. Shah, Director of Veterinary Services, Lahore.

As Dr. Badami had to resign the Secretaryship, Rao Bahdur M.R.Ramaswami Sivan was appointed Secretary. Mr.F.J. Gossip, Livestock Expert, Bengal, Dacca, was later on appointed an additional member of the Sub-Committee; and, in the place of Mr. Shah who resigned, Mr. Sar-ud-din, Professor of Animal Husbandry and Dairying, Punjab Veterinary College, Lahore, was co-opted.

3. The first meeting of the sub-committee was held at Bombay on 24th October 1939, the following members attending:-

Sir Chunilal Mehta (Chairman), Mr. M.R.Ramaswami Sivan, Dr.B.K.Badami, Mr.E.J.Bruen and Professor K.T.Shah, General Secretary and Mr. K.D.Guha, Joint Secretary, of the National Planning Committee, were also present.

4. The need for a long questionnaire was considered unnecessary, in view of the fact, that most Government Departments had been working on problems relating to Animal Husbandry and Dairying and had collected sufficient statistics for the Sub-Committee to carry on. A circular letter was, however, sent to Directors of Agriculture, Directors of Veterinary Services, Livestock Experts and Imperial Experts of the Govern-

Government of India and some private individuals, asking for suggestions with regard to points on which the National Planning Committee should concentrate. Replies were received from some persons, each giving some specific hints on particular aspects of the problem, while some of them sent relevant publications dealing with cattle breeding, dairying, marketing, poultry-keeping, sheep-breeding and bee-keeping (vide Appendix..) These replies and publications will be utilised in the preparation of the Report by the Sub-Committee.

Apart from replies received to the circular, several useful communications were received, which are noted in Appendix II. Appendix ..gives a statement of books, reports, bulletins, leaflets and other publications received and consulted.

The response to the circular was, however, not as adequate as one could wish, and the Secretary visited the following places, with a view to obtain first-hand information:-

- (i) Palyakottah (Coimbatore)-- to see the Cattle Breeding Station (Kangayam breed) belonging to the Pattagar of Palyakottah.
- (ii) Bangalore--to see the Imperial Dairy Institute, Bangalore and the City Milk Supply.
- (iii) Coimbatore, Cuddalore, Madras -- to study the working of recently started Co-operative Milk Unions.
- (iv) Guntur--to see the Government Cattle Farm (Ongole breed)
- (v) Nagpur -- to study the working of the Telankhery Co-operative Dairy and Poultry Farm.
- (vi) Hyderabad -- to see the Cattle and Dairy Farm and discuss with Dr. B.K.Badami.
- (vii) Poona -- to see the Cattle, Dairy and Poultry Farms and discuss with Mr. E.J.Bruen.
- (viii) Kandivli -- to see the Gaurakshak Mandli, Bombay (Gir breed)

- (ix) Chharodi, Gujerat -- to see the Northcote Cattle Farm (Kankrej Breed)
- and (x) Anand -- to see Polson's Factory.

The visits to the above places and the personal discussions with the Experts and Managers concerned were very helpful.

5. It will be noticed that, while information, and sometimes detailed information, has been given in the draft report with regard to some Provinces and Indian States and with regard to particular localities therein, the report may be said to be incomplete in that it has not dealt with problems appertaining to some other Provinces and localities, for the reason that, reliable information was not available and that no communications or publications relating to them were received from them. The general conclusions arrived at in the Report may however, be said to apply *mutatis mutandis* to all Provinces and States in India.

6. On the several items of reference to this Sub-Committee mentioned on Page 87 of the Red Pamphlet of the National Planning Committee, most have been dealt with in the draft report. Definite information is not available with regard to some of the products of animals, namely, hides, horns, hair, bones, guts etc; and^a supplementary report may be prepared at a later date, if necessary.

7. It is well to remember and to recognize that substantial work has already been done and is being done, or Animal Husbandry and Dairying by the following Agencies in India, who have gathered fairly accurate statistics and who have published copious literature on the subject. Reference is invited to the publications and the reports of the Imperial Council of Agricultural Research and of its Advisory Board and of the Animal Husbandry Wing of the Board of Agriculture.

8. The Government of India maintains the Imperial Agricultural Research Institute at Delhi, the Imperial Dairy Institute at Bangalore, the Imperial Veterinary Research Institute at Muktesar and the Imperial Animal Nutrition

Nutrition Institute at Izatnagar, all manned by superior, well-trained Research staff. There is the Imperial Council of Agricultural Research at Delhi, with special experts for Animal Husbandry and Marketing, with its Fodder and Grazing Subcommittee and the Animal Husbandry Wing of the Board of Agriculture. Apart from Conferences of Ministers of Agriculture from the Provinces for deliberation of matters of policy and administrative problems, the Government of India hold, from time to time, for technical purposes, meetings of the Animal Husbandry Wing, the Fodder and Grazing Committee, the Marketing Committee etc. and organise Cattle Conferences and Cattle Shows, Bee Conferences, Poultry Conferences and Poultry Shows. The reports of Sir John Russel and Dr. Wright have become the basis for future work in India.

9. Provincial Governments and Indian States:-

The Provincial Governments and the Governments of several Indian States have substantially added to the stock of knowledge in Animal Husbandry and Dairying in India, through their Director of Agriculture and of Veterinary Services, their Livestock Experts, their Provincial Marketing Officers and their Fodder and Grazing Committees. They have their own Livestock Research Stations for cattle, sheep, goats, poultry and bee-keeping, and all agricultural Collges maintain a cattle and Dairy Farm and a Poultry Yard.

10. There are several co-operative agencies working all over the country in this subject. Special mention may be made of producers' societies, the best example of which is the Co-operative Dairy run by Goolies at Nagpur.

11. There are private concerns, who have taken up cattle breeding and mention may be made here of the Pattagar of Palayakottah, who breeds the pure Knagayam, breed, the Draught cattle of South India, and of the Gaurakshak Mandli of Kandivli dealing with the Gir breed, one of the well known milk breeds of Bombay. There are also professional hereditary breeders such as the Lambardas and Dhandars of the

the Deccan and Central India, the Rabaries and Bharwas of Gujerat and Kathiawar and the Jats and others in the North. Mention may also be made of grantee farmers of the Punjab.

12. Aims of Planning:-

As with all other industries, planning with regard to Animal Husbandry and Dairying should aim, in its broadest aspects (i) at making India self-sufficient for all its requirements, and (ii) at adding to the wealth of the country and improving the economic conditions of the people, of the masses in particular. This planning will naturally amount, therefore, to the necessity for improving the breeds of all kinds of live stock, for producing more milk and milk products in the country and for lessening the cost of production to such an extent that all classes of people will consume more milk and milk products and will thereby attain a higher standard of health.

13. (A) Animal Husbandry:-

Under the heading of Animal Husbandry, the following points require consideration:-

- (i) To evolve better breeds of all kinds of Livestock -- cows, bulls, buffaloes, sheep, goats, poultry etc.,
- (ii) to improve the present Livestock by selection of good cows and of suitable breeding animals, either with the stock available in the locality or by transport from one part of the country to another,
- (iii) to evolve pedigree breeds of cattle for milk or draught purposes or for the dual purpose of milk and draught;
- (iv) to provide for the care and disposal of surplus stock;
- (v) to suggest suitable salvage operation, including the licensing of animals for the slaughter-house;
- (vi) to provide for immediate treatment of animals in disease and prevent the spread of contagious diseases.
- (vii) to make proposals for:-

- (a) adequate pasture;
 - (b) provision of grazing areas by demarcation of low jungle and other forest areas and of poramboke waste lands, grazing to be allowed under controlled conditions;
 - (c) providing facilities for growing fodder crops under irrigation and extending Government concession from payment of land assessment and water rate, in areas devoted to the growth of fodder crops only;
 - (d) storage of dry fodder as straw, hay or ensilage, to ensure adequate supply of roughage in seasons of draught and famine.
 - (e) provision of adequate quantities of all kinds of concentrated food.
- (viii) to evolve breeds of sheep for better wool producing capacity;
- (ix) to evolve suitable breeds of goats to add to the milk supply of villages.
- (x) to evolve better breeds of poultry for their egg-laying capacity.
- and (xi) to organise bee-keeping as a Cottage Industry in localities where food for the bees is available throughout the year.

14. As regards Dairying proper, the following points require detailed consideration:-

- (i) to increase milk production in the country, and at the same time, lessen the cost of production;
- (ii) to maintain and distribute pedigree herds;
- (iii) to suggest improved and hygienic methods of handling milk and milk products;
- (iv) to indicate the products in which the processing of milk must be done;

- (v) the manufacture of butter -- (a) by separation of cream and (b) by the Desi method from fermented whole milk or curd.
 - (vi) the manufacture of ghee -- (a) with the help of the cream separator or (b) directly from fermented whole milk or curd;
 - (vii) utilisation of separated milk and butter-milk;
 - (viii) manufacture of by-products -- kinds, possibility and limitations;
 - (ix) desirability and possibilities of starting Dairy Manufacture on Factory scale;
 - (x) providing facilities for transport of milk from villages to collecting centres, and from collecting centres to urban areas;
- and (xi) co-operative methods applied to all aspects of Dairying:- the evolving of pedigree animals; collecting, handling, transporting and distribution of milk and milk-products; the manufacture of butter, ghee and other milk products; and co-operative marketing.

15. Cattle breeding and Dairy Farming as such are not practised largely in India with the exception of some hereditary breeders, referred to in para Villagers own some working cattle and one or two cows and she-buffaloes for consumption of milk by the family and for sale of surplus milk or ghee. It is mixed farming that is largely followed in the country. Agriculture and the growth of crops are the main concern, cattle being only aids to arable farming and of subsidiary importance. It is the village population that stands in immediate need of economic improvement and it should be our aim to make the villager take a little more interest in his Livestock, without detriment to his usual avocation of farming. He must learn that better breeds of milch animals will add to his income by increased yield of milk and milk-products and that stronger work-

working animals will improve the draught capacity of his bullocks; and that it is, therefore, to his advantage that he should have well-bred and well-fed Livestock attached to his household.

16. Cattle in India.

The world's cattle population, according to a recent estimate, comes to about 690 million animals. Indian cattle are estimated at 215 millions, and India has the largest cattle population in the world. Animal Husbandry is, all the same, extremely backward when compared to other countries. The village cattle are non-descript, weak, puny animals, easily susceptible to diseases, especially epidemics. They are uneconomical to keep, and form a big drain on the cattle wealth of the country. One reason often advanced for this state of things, is that the villager is sure of some cattle being left over for his agricultural work, even if a good number of animals die in epizootics and during famine years. The real reason, however, is that there has been no restriction in the control of the cattle population and that, as a result of inferior bulls which roam about in the midst of village cows, covering the cows indiscriminately, there has been an accumulation of inferior progeny. There has been, therefore, neither an improvement in draught quality nor in milk production. They consume the scanty grass of the village grazing areas and cannot be said to be properly fed. The loss of good breeding characters and the consequent deterioration of type has been the final result.

17. Cross Breeding:-

Attempts have been made in the past, especially with the object of increasing milk qualities, to introduce cross breeding with imported, recognised breeds. The results have been fairly successful in the beginning, but the imported stock and their progenies did not get sufficiently accustomed to the changed environments, and the results of cross breeding with foreign breeds have generally been most disappointing.

18. Indigenous good breeds:-

It is a matter of some gratification, however, that, in

the midst of the promiscuous breeding and multiplication, which have been in vogue so far, there are still left in the country, indigenous breeds of good draught and milk capacities, in several tracts, all over the country. These may be said to have survived the onslaughts of famine and pestilence, and, when properly protected, may be considered as immune from diseases. Future breeds of cattle must be built up from these surviving good breeds.

19. As far as possible, breeding should be confined to the superior cattle of a particular locality. It may be necessary now and then to draft bulls, and sometimes cows, from one locality to another, but it would be prudent to import cattle from localities which have similar climatic conditions. Grading up present cattle is a difficult and slow process, but it has to be preserved in for several decades. Instead of attempting experiments all over the country at the same time, it may be desirable to concentrate in a few selected villages and gradually expand, as more breeding bulls become available.

20. Brahmani Bulls:-

The art of good breeding was not unknown in India in ancient times. Good bulls, perfectly proportioned and possessing all the essential points recognised as important in the sires, were selected in the past and dedicated to temples, at the time of certain religious rites, by the members of the Village Panchayats. There is no selection for its breeding qualities in these days, when a bull is dedicated. Usually a non-descript, puny, little bull calf is purchased for a very small sum, branded, and let loose in the village. It would be an advantage if the villagers realise their responsibilities and help to select suitable bull calves whenever there has to be a dedication of bulls.

21. There has been considerable difference of opinion regarding the objective with which breeding operations have to be conducted. Some are of opinion that, as the country is in need of more milk and milk-products, the evolution of milch cattle should be most prominent. Others contend that the villager is

in need of cattle for agricultural operations and that the production of draught animals is more important. Fortunately we have special milch breeds and special draught animals. Without upsetting the economy of production of pure milch cattle and of pure draught animals, it is possible to produce what may be termed general purpose animals. Milch cattle and draught animals are each important in their own way and must be bred to type; at the same time, more attention must be paid to produce animals which will serve the dual purpose of milk and draught. Such general purpose animals have been successfully bred in some Provinces and Indian States.

22. Care of Breeding Bulls:-

While good cows are important in breeding, it must be borne in mind that breeding bulls set the stamp on the future progeny. These breeding bulls must be carefully and specially selected for their good points and must be properly fed with sufficient quantities of suitable concentrates and roughage; and there should be a limit to the number of services in a year, as otherwise they will lose condition. Light work on the farm is helpful in preventing breeding bulls from getting flabby, with undue accumulation of fat. Wherever breeding bulls are maintained, it is essential that herd registers in approved form should be maintained, and it must be easy to trace pedigree animals, which should, therefore, be specifically marked. Young bulls and he-buffaloes should not be used for breeding before they are three or four years old and the number of services should be limited, until after they are 5 years old, when the services may go up to about 70 per annum.

23. It is the primary function of government to open cattle breeding farm in each suitable track even in country for the purpose of producing the bulls and cows that are to be sent out in the various parts of the province. This work cannot be undertaken by private effort and the committee would stress this as the primary function of the state and recommends that sufficient funds should be made available for the purpose.

24- The Government should devote all its energies and resources to the improvement of the milking capacity of the cows by the introduction of good milched cows like the Gir, Kankrej and by providing facilities for the crossing of village cattle by selected bulls. In special tracts like the Konkan, buffaloes give good amounts of milk and the progeny of it form an important portion of draught animals. The buffalo should be regarded as dual purpose animal and receive similar encouragement until a dual purpose cow is found to replace it.

25. The sub-committee wishes to point out that cattle breeding cannot be conducted everywhere. There are areas in each Province that are more suitable to produce economically good cattle, and there are other parts which are not suitable for breeding or where the people have no inclination to take up cattle breeding. Each province should, therefore, make a preliminary survey to determine the localities suitable for breeding and should concentrate future operation in such locality. In other words, economically sound animals can be produced only in certain areas and only where the people have a keen desire to take up animal breeding as a profession.

26. Facilities for Professional Hereditary Breeders.

The Committee would like to point out that the professional hereditary breeders all over the country have been the back-bone of the supply of cattle for generations. They have acquired an amount of knowledge and experience which are most useful for cattle breeding. We are constrained to point out that, with the growth of population and the pressure of cultivation upon forest and open areas, the facilities hitherto enjoyed by these breeders are being diminished and their number is slowly decreasing. While they are performing useful service to the country, it would be necessary to study their special requirements and to give them such facilities with regard to grazing or with regard to colonisation, as may be required, or scientific aid.

The Pattagar of Palayakottah.

27. The attention of the Planning Committee may be invited to

the excellent work on Cattle breeding, carried on by the Pattagar of Palayakottah in Coimbatore District. He is a rich land-holder owning large areas of dry land, which he has enclosed in convenient blocks, and in which a variety of grass called Kolakattai grass is systematically grown. For generations the family of the Pattagar has taken up cattle breeding as main profession. He breeds only the Kangayam breed, noted for its sustaining, draught qualities. Whether for ploughing or for road transport or for lifting water by mhots, the Kangayam bullocks are well-known in South India. The cows are poor milkers, but they are well cared for. It is on the bulls that the Pattagar devotes greatest attention. The breeding bulls from Kangayam have not only been distributed in several districts of South India but have occasionally be exported. He gives special attention to each class of animals, breeding bulls, working bullocks, cows and calves, and these animals are separately grazed in paddocks. Herds of animals are moved from one grazing block to another after a month. Manured as the blocks are with the entire droppings of animals, the first rain that falls on the land produces luxuriant grass; and, when the grass grows about 6 inches high, herds are let in again. Once in 5 or 6 years, the grazing areas are ploughed up and rotated with a cereal dry crop for a year or two, and afterwards replanted with tufts of kolaktaai grass. The annual rainfall of the locality is not more than 20 inches, but best use is made of the rain. His cattle population, including calves, was 2,000 at the time of my visit. The Royal Agricultural Commission makes special mention of the Kangayam breed of cattle as an outstanding example of careful cattle breeding.

28. Agencies to carry on breeding:-

First and foremost, Government should undertake the maintenance of breeding stations for producing high class breeding bulls and he-buffaloes for distribution.

(ii) the system of distributing Premium bulls amongst

should be extended to include he-buffaloes and improved upon, with a view to maintain such animals in proper condition, by increasing the grant now given for their maintenance;

(iii) encouraging Co-operative Breeding Societies to function as breeding centres, as recommended for instances by the Bombay Expert Cattle Committee, by providing one breeding bull for every 20 milch cattle kept in a village unit.

and (iv) by helping private cattle breeders with facilities for fodder and grazing areas and advances on loans, repayable in convenient instalments, for purchase of bulls etc.

29. The practice obtains in some parts of the country or collecting Dhamadaya, a voluntary levy on each herd of cattle sold at cattle fairs and of utilising the collection for running Pinjrapoles and occasionally for local temples. The system may be organised all over the country with voluntary levy of different fees on different kinds of livestock, so that the proceeds may be utilised for running pinjrapoles and for better breeding of future livestock. The agency to collect such fees should, by preference, be the village panchayats.

30. It is the primary function of government to open cattle breeding farms in suitable tracts for the purpose of producing the bulls and cows that are to be sent out to the various parts of the country. This work cannot be undertaken by private effort and the committee would stress this as the primary function of the state and recommends that sufficient funds should be made available for the purpose.

31. The remarks made in the above paragraphs about bovine animals apply equally to buffaloes. Buffaloes in several parts of the country are comparatively small, decrepit animals, but there are still superior breeds in India, of excellent milking capacity, like the Delhi buffaloes, Jaffarbadi, Soorti etc. They are even better milkers than cows. They are coarse feeders compared to cows and can subsist in areas where cows will not thrive. Breeding of buffaloes has been neglected, and breeding bulls of recognised milking capacity should be imported into

several parts of the country. Producing generally larger quantity of milk with a higher percentage of fat they are so far the better animals in India for manufacture of butter and ghee and for dairy purposes in general. The he-buffaloes are used in the cultivation of paddy lands and heavy draught purposes in country roads. It is not an uncommon feature that buffalo she-calves and cattle he-calves are better fed and looked after than buffalo he-calves and cattle she-calves because economically the she-buffalo and the bull are more useful to the villager. It must be admitted that male and female calves of both buffaloes and cows require equal attention.

In special tracts like the Konkan, buffaloes which give a good amount of milk and the progeny of which form an important portion of draught animals should be regarded as dual purpose animals and should receive similar encouragement until a dual purpose cow is found to replace them.

32. The one important point which the Sub-Committee have always kept before their view is the fact that Indian Agriculture requires a large number of bulls and bullocks, both for the purpose of cultivation and road transport. We have attempted to keep in mind the necessity for encouraging what is known as the dual purpose of the general utility of animal, so that both cow and the bull can perform their respective functions in planned economy, with the result that both the animals will be fair and taken care of in a proper manner. We have, however, come up against the difficulties that in certain areas which are not suitable for bulls and bullocks, cows give no more than a very limited quantity of milk. If it is attempted to increase the milking capacity of the cow, the danger in these areas is that the crops required for the bull and the bullock for cultivation and for draft will be affected. Under such circumstances the cows in these areas must remain as very poor milkers and consequently an economic liability. It is possible that by the provision of better road facilities by the increase of motor transport and railway transport, the requirements of the cultivator for specialised draft may be lessened.

It would then be possible to embark upon this policy of evolving the general utility of the animal. The Sub-Committee recommend that the requirements of each particular graft should be carefully studied keeping the above plan in mind.

33. The Sub-Committee considered the question of the competition of the cow and buffalo. The conditions of Indian agriculture require a supply of bulls and bullocks for cultivation as well as for transport. There is also an in-born sentiment in favour of the cow, but so long as the cow continues to be neglected and ill-fed she will never be able to compete with the buffalo as a milk producer either with regard to quantity of milk or its butter value. It is no doubt true that in the present conditions of the gross neglect of the cow, she is easily beaten by the buffalo, but it has been proved that where proper attention has been paid to the cow and its milking capacity by better breeding and feeding, she has been able to give a quantity of milk which compares favourably with that of the average buffalo. The butter content of the cow's milk has been raised as much as 5 to 5.6 per cent. It is also worthy of remark that if the number and the length of lactation of the two animals are taken into consideration, it will be found that the milking period of the cow during its life is longer than that of the buffalo. Also it is believed by the public on good authority that cow's milk is better for human consumption and especially for the young and the weak. A buffalo, on the other hand, while she is a good producer of milk, consumes a larger quantity of food and her male progeny is useless, except, only in certain cases where the male buffalo is used for cultivation. But generally it is found that the male progeny of the buffalo is, if not actually killed, allowed to die of starvation. This is a state of things which is both inhuman and economically unsound for a poor country like India to maintain a breed for milk and another for cultivation. This Sub-Committee recommend, therefore, that the cow should be concentrated upon as the producer both of the bull and the bullock required for cultivation and of

the milk for human consumption. In those grafts where it is not possible to realise these objects the buffalo may be suitably attended to.

34. In his address delivered at the recent Indian Science Congress at Madras on Animal Husbandry, Dr. Haddow reviews the present position of the livestock in India and points out how far disease and famine have been responsible for the deterioration of all kinds of livestock. While the serum simultaneous inoculation method and the goat-virus method have been successful, the epizootiology of the disease has not been fully studied owing to want of trained staff. He points out the need for researches in the diagnosis and treatment of all diseases virus, bacterial and protozoan. He states that the low protein content of cattle-food is responsible for the deterioration of animals and for their inability to resist disease. Dr. Haddow points out the lack of adequate research work on sheep and goat and pleads for an increased knowledge of genetics as essential for evolving the essential and desired characters in all kinds of livestock.

35. Control of cattle Disease:-

98,746 animals died from contagious diseases during the last 6 years in Bombay, of which 60,359 due to deaths from Rinderpest only. The control of epidemic diseases is necessary adjunct to the improvement of Livestock in the country, and the Director of Civil Veterinary Services should be given more staff and resources for the purpose. Compulsory vaccination and examination of cattle at Provincial boundaries will restrict the importation of cattle diseases into the Province from outside. Movement of cattle in villages or areas in which Government assistance is given for cattle improvement.

36. While fattening of animals for beef or mutton or pork, has not been the aim in breeding operation in India, as in other countries, it must be recognised that the use of non-vegetarian food is a common feature amongst the bulk of the population in India, with whom there is no religious or caste

objection to the use of animal food. Beef may be tabooed amongst Hindus, and bacon amongst Hindus and Muslims, but mutton and goat's flesh, poultry and fish are common articles of diet amongst all classes of people except those who are strict vegetarians. Cow slaughter is a heinous crime amongst Hindus; all the same there is a large class of the population of India who would prefer animal food, and the bulk of the population has now become vegetarian in habits, out of necessity than owing to religious objections, for the simple reason that, they are too poor to purchase the more costly animal diet.

37. Religious objections apart, it may be considered an advantage if useless surplus stock are disposed of, but the fact remains that good animals, otherwise economically useful for draught and milk purposes, are also slaughtered, especially in cities, causing a serious economic drain to the country. Total prevention of slaughter of cattle is not possible. What should be aimed at is to prevent the slaughter of good animals of recognised breeds which have a future usefulness for breeding and milk production. The enormity of this slaughter can be exemplified from the figures recently collected in Bombay City. 16,635 bullocks, 33,316 cows and 18,019 she-buffaloes of different ages were slaughtered in the Bombay Municipal slaughter houses at Bandra and Kurla during the year 1938-39. No he-buffaloes were killed. The slaughter of useful milch cattle is a direct result of the existing system of city Dairy stables; and an alteration of this system in favour of milk production outside city limits is the first and most essential step to be taken for the protection of milch animals and for a satisfactory, indigenous Dairy Industry. It is essential that Government and Municipalities should establish Dairy areas outside cities, where milk producers can milk, breed, and rear milch stock and maintain dry animals as well.

38. Legislation is essential for the licensing of each slaughter:

slaughter house, where a qualified Veterinary Officer should be on full duty during working hours. Such Officer may also be entrusted with meat inspection and with the issue of certificates for hides and skins. Separate officers should be appointed for milk inspection. Slaughter of animals of scheduled breeds should be absolutely prohibited, unless certified as unsuitable for further use. The duty of deciding what animals can be admitted into a slaughter house should devolve upon the Veterinary Officer who should have detailed instructions for the purpose and who should be responsible to prevent unnecessary and undesirable slaughter.

39. Railway authorities should give wide concession on freights for removal of dry milch animals from the city to rural areas and, if necessary, to enhance railway freight on milch cattle brought from rural areas to towns.

40. Government should arrange for the protection of these dry animals by taking them to rural areas, or the work should be entrusted to, and undertaken by, private Cow Protection Societies, who urge the prevention of slaughter. If dry animals are retained in cities, encouragement will be given to gaolies to prolong the milk period by cruel mal-practices like phooka, with the result that the animals will be irretrievably ruined for ever. There is no immediate need to take legislative measures to control the slaughter of milch animals outside urban areas, as much slaughter is not appreciably done in village parts. It has been noticed that there is a great mortality amongst calves in cities and these calves can be saved by artificial feeding with skim milk and gruel and by removing them in time to village areas.

41. The production of milk in large cities is so closely connected with the slaughter of useful cattle therein, and the Sub-Committee would like to make it clear that the slaughter of dry cows and buffaloes and the premature death of calves in cities is largely an economic proposition, in that it would not pay cattle owners in cities to feed and rear dry animals by keeping them in cities and that the gaolies would want all

the milk of the cows and could not afford to give even two pounds of milk to the calves. The only alternative is that Provincial Governments and Municipalities should prohibit the keeping of milch cattle in cities, and should provide suitable land near towns and cities where the city milk supply can be produced and where the cattle can live a natural and cheaper existence. Such land, if situated in the command of Canals, it will be ideal; failing this, good land irrigable for wells, will meet the case.

42. There is a strong sentiment in the country against slaughter of animals and for providing institutions like PINJRAPOLE for taking care of the old and infirm cattle. Large sums of money are being subscribed through commercial agencies in the shape of cess for the maintenance of these institutions which are spread all over the country. It is true that India possesses perhaps the largest cattle population in the world. Unfortunately the majority of these cattle are uneconomic and in fact encroach upon the fodder supply required for the healthy animals. The only way by which slaughter can be prevented is making the animal an economic proposition so that it would be taken proper care by the owner and the cultivator. It is quite possible to utilise some of the funds used by the institutions mentioned above for the purpose of cattle breeding. So long as the sentiment in favour of making provision for the old and infirm cattle exists, part of the funds of this institution may be utilised for maintaining the pinjrapoles, but a part ought to be set apart for the purpose of cattle breeding. That it is possible to do so has been proved by the experience of the Bombay Gowrakshak Mandal and the Bombay Pinjrapole. We recommend that provincial governments should examine the individual local conditions and take such action on the above lines as may be necessary.

43. Castration.

Unless useless bulls are castrated, the work of improving Animal Husbandry will be unsatisfactory. With the new process

of vein crushing objection to castration is disappointing. Attention may be invited to the enactment of the Bombay Live-stock Improvement Act, whereby provision has been made for compulsory castration of useless bulls in certain tracts of the Bombay Presidency, covered by some local option and a number of loose regulations. The provisions of the Act may be **stiffened** with advantage. It is satisfactory to note that a Bill is being introduced in Madras on the lines of the Bombay Livestock Improvement Act. We recommend the introduction of similar acts in all Provinces and Indian States.

44. International convention demands that skins and hides, meant for export, should be examined and certified by proper authority as being free from contamination from infectious diseases. Regarding export of skins and hides, tanners and shippers should be consulted. Measures should be undertaken by Government to regulate quarantine and transport of animals from one country to another. The value of skins and hides is much reduced by the branding of animals on the hips. It is recommended that branding may be done on the checks of animals and individual identification secured by **tattooing** on the back of the ear.

45. Co-operation.

The key to the solution of all problems connected with Animal Husbandry and Dairying in India lies in Co-operation, cooperation organized from the bottom and not superimposed from the top, and emanating from the desire of the villagers to cooperate and not thrust upon them by well-meaning officers of Government. The Co-operative Departments all over India have been, more largely, interesting themselves hitherto, in organizations for credit and, only recently, some attention is being paid to Co-operative Production Societies, Marketing Societies and Consumers' Societies. The attention of the National Planning Committee is invited to (a) the working of some Co-operative Dairy Societies in India (b) the working of the cooperative system

and (c) the future lines of developments of cooperative organisations in India, as envisaged by the Bombay Expert Cattle Committee. These will be discussed in some detail. Of the Co-operative Societies in India, mention may be made of :-

(i) the Telankhery Co-operative Dairy Society of Nagpur (ii) The Calcutta Milk Supply Union (iii) The Lucknow Milk Supply Union and (iv) some Milk Unions of the Madras Presidency.

46. The Telankhery Co-operative Dairy, Nagpur:-

Thirty years ago a dozen gaolies joined together as a milk supply Society in one of the suburbs of Nagpur and in the same year Government started a Dairy Farm at Telankhery village on the outskirts of Nagpur. Neither was profitable; and the gaolies and Government combined at one centre, Telankhery. The gaolies brought their cows and she-buffaloes and the average yield of the combined herd was 800 lbs of milk per day. Government provided facilities to the gaolies and the gaolies, in their turn, paid for everything, in the shape of rent for the buildings and cattle sheds, fees for grazing, commission on wholesale purchase and supply of concentrate and fodder, hire of feeding troughs and milk pails and establishment charges for collection and distribution of milk. Cleaning of stalls, grazing, feeding and milking of animals was done by the gaolies themselves under the direct supervision of the Superintendent of the Government Farm, who was responsible to see that the cows were washed and the milking vessels were kept clean, and that the entire milk was handed over to the Dairy. Steps were taken to minimise outbreak of diseases by preventing cattle from straying out of bounds. Five years later, the gaolies of another suburb joined the Society. For some years the agency for selling was given to Private Party but was resumed by the Government in 1926.

47. The affairs of the Society were managed by a Panchayat under the guidance of the Deputy Director of Agriculture, whose sympathetic guidance was followed by the strict discipline adopted by the Panchayat, including suitable rewards and

punishments, to which the gaolies loyally agreed. In the year 1935, the average net profit of each of the 18 gaolies of the rolls amounted to Rs.1,2,50/-. In 1935 Government handed over complete management of the Farm to the Cooperative Society and the average profit during the last four years was Rs.1,452/- per annum. Rules have been framed by the Society for purchasing breeding bulls, advancing loans to individual members, stocking cattle food, concentrates and roughage, leasing grazing areas and collection and distribution of milk. The Society is now in full charge of (i) the Byramjee Dairy with its equipments (ii) a cattle food depot (iii) the old grazing areas of 1,000 acres adjoining the Telankhery Tank on an annual lease of Rs.2,000/- (v) a new grazing area of the adjoining reserve on an annual lease of Rs.7,000/- (vi) collection and storage of hay and (vii) cattle sheds and quarters rented at Rs.1,839/- per annum. Milk is purchased at $4\frac{1}{2}$ pies per seer and sold at 3 annas, the profits eventually going up to the gaolies, as there is no middle men. The Society now runs a Primary School and affords medical aid and there is a proposal to start affiliating Rural Co-operative Collecting Societies with suitable pasteurising plant to be called the Federation of Cooperative Dairy Societies of Nagpur.

48. The distinguishing characteristic of the Telankhery Co-operative Society of Nagpur is that the members are gaolies (who started with a small number of cows and she-buffaloes and who own 25 to 50 animals each), that their cattle are housed, grazed, fed and milked at one centre under departmental supervision, ensuring a fair amount of cleanliness in the handling of milk before distribution, that the members have acquired a spirit of self-reliance in that they pay for every facility afforded by Government. The gaolies recognise that they are indebted to the officers of the Agricultural Department for doing all the spade work in the initial stages of working and are now happy that they are able to stand on their own legs. The Cooperative Milk Unions established in several cities and

towns where the care, management, housing and feeding of animals are left to the villagers themselves, without departmental supervision, the only condition imposed by the Milk Unions being that the cows must be brought to a common milking centre.

49. The Federation of Milk Unions in Calcutta started with one Village Society in 1917 rising to 10 Societies in 1919. There was gradual increase in the number of affiliated societies from year to year, with the result that there were 123 Primary Societies in 1935, with 7,500 members as Share capital of Rs.18,000/- a Reserve fund of Rs.72,500/- and a Working Capital of Rs.99,300/-. The Union has a staff of Managers and Supervisors in the villages, who are paid a fixed pay plus a commission on the milk collected. The milk is transported to Calcutta in sterilized cans. The Calcutta Corporation gave a grant of Rs.5,000/- for non-recurring charges and a loan of Rs.50,000/- which is utilised by the Union for making advance to members for the purchase of milch cattle and for leasing lands for pasture and for growing fodder. 250 tube wells have been constructed in villages, 19 village schools have been started, medical aid is afforded to villagers and periodical lantern lectures are arranged for. The Collecting and distributing Centre at Bow Bazaar, Calcutta has facilities for laboratory analysis and for pasteurising, cooling, bottling, washing, refrigeration and air-locking; and Motor Vans carry the air-locked milk cans to markets, hospitals and private houses.

50. The Lucknow Cooperative Milk Supply Union.

This Union was formed only 2 years ago with 8 registered Societies and 24 unregistered Societies. In addition to cows already owned by members, 124 milch cattle were supplied to them on taccavi loan. The Union handled 4,53,000 lbs. of milk and made 1000 lbs of butter and 1000 lbs of ghee last year. The net profit of last year was Rs.1,035/-. Government of U.P. gave a grant of Rs.30,000/- which is being utilised in the purchase of a motor van and in constructing wells and erecting sanitary milk

sheds in the villages concerned. An I.D.D. has been appointed Manager and the Union has provided employment to 130 men. The villagers have profited by having good milch cattle and getting a ready market for their milk at good prices, and the consumers are supplied with more wholesome milk at comparatively cheap prices, and the milk problem of the city of Lucknow has been partly solved. Dr.K.N.Katju and Mr. N.C.Mehta I.C.S. have testified to the usefulness and satisfactory working of the Milk Union and have suggested extension of the scheme to other cities and towns of U.P.

Milk Unions in the Madras Presidency.

51. The Milk Unions started in Madras and several moffusil towns are recently established societies, the results of whose working are not available. There is a future for similar Milk Unions, organized on cooperative lines all over the country so that unadulterated milk may be sent from the milk collecting centres. Great care is essential to see, however, that such milk sent from a Cooperative Centre, which is presumed to be genuine, does not get adulterated during transit and retail sale, before it reaches the consumer.

52.

B. COOPERATION.

Cooperation in Denmark:-

Although Denmark entered the cooperative field later than some other countries, the progress made by that country in cooperative activities is marvellous, and the methods of cooperative organisations adopted in Denmark are an object lesson to India. The growth of Cooperative Organizations in Denmark was mainly due to a few main factors, national education, capture of political power, passing away of landlordism and cooperation in every activity and consequent raising of the standard of living in villages.

53. Cooperation.

When the educated peasants became owners of small farms, the need for active cooperation amongst themselves was keenly felt by them, and cooperative Societies were formed from time to time in every village and for a number of purposes, for production,

transport and sale and for manufacture of goods, and purchase of requirements. The village organisations were connected with the central cooperative Banks and Societies at the capital. Even railways are worked as a national concern with minimum fare and freight and not with the object of earning an interest on capital invested. Cooperative Milk Unions and collecting centres and butter and cheese Factories were the first to engage the attention of these peasants. The total milk production in Denmark in 1934 was 11,800 million lbs. of which 80 per cent was utilised for butter-making. Egg-producing Societies, Bacon manufacturing Factories, and fertilizer purchasing Societies, came next to be realised as equally important concerns. The Danish peasant is imbued with the spirit of cooperation practically in all transactions of life and there are cooperative Factories for clothing and tobacco, for roasting coffee and making chocolates, for Rural Electrification and Rural Transport, for Mutual Insurance, Unemployment Insurance, Old Age Pension and Cattle Insurance and so on. It is worthy of note that cooperative activities have emanated in every case from the desire of the villagers to cooperate and have not been superimposed on the villagers by the Officer of Government. This is the great lesson that Denmark teaches India. It may be that, in the present state of the economic condition of the people of India and the illiteracy and poverty of the villagers, considerable amount of Government help is needed in the initial stages; and this help should ^{be} in the nature of provision of facilities and guidance rather than of charitable doles. Speedy acquirement of literacy by the people and the organisation of villages into Panchayats on an extensive scale will naturally lead to the starting of cooperative organisations in villages in a spirit of self-reliance and of self-respect. One must always remember that, after all, cooperation is business and not charity.

54. Detailed statistics are available to show the growth of the co-operative movement in Denmark in every line of activity and a concise statement is furnished in the following table:-

Co-operative Societies.	No. of Societies.	No. of members.	Turn-over in Millions of Kroners. (Approx. 1 Kroner=1R)
<u>Production and Sale Societies:-</u>			
-- -- Dairies	1,402	190,000	445
-- -- Butter Export	11	641	134
-- -- Bacon Factories	60	179,873	471
-- -- Egg Export	700	45,000	21
-- -- Cattle Export	15	12,227	5
-- -- Seed Supply	1	3,400	4
Total	2,189	431,141	1,080
<u>Agricultural Purchasing Societies:-</u>			
Purchase of food stuffs	1,387	89,473	90
Manure supply	1,450	60,000	16
Dairy machinery etc.	1	1,380	7
Cement factory	1	1,097	3
Coal supply	2	625	7
Total	2,841	152,875	123
Consumer Societies.	1,824	335,900	403
Other Co-operative Societies.	6	749,946	11
Grand Total	6,860	1,669,862	1,615

55. Adulteration of Milk.

The Co-operative Society may take all possible care and send genuine milk in sealed cans, but instances have been reported of unscrupulous hawkers using their ingenuity to adulterate the milk with water, without disturbing the seal, whereby the good name of the Society is endangered. A precautionary measure is suggested. The Society may affix a label on each can stating the specific gravity of cow's milk is higher than that of buffalo's milk, and skim-milk is heavier than cow's milk. The specific gravity is liable to vary, from day to day according to the breed of the animal, the nature of fodder, the month of lactation and also between the first drawn and last drawn milk from the udder. When the milks of several cows are mixed up before pouring into the milk cans, the specific gravity will, more or less, be constant say 1030 for the cow's milk and 1025 for the buffalo's milk. The consumer can test the delivered milk with a Lactometer and notify the Society if there is disparity in the Lactometer Reading.

56. Regarding cow's milk or any milk to be consumed in quantities desired by the public, it is essential that pure supply is secured by the distribution of pure milk. The Committee is very strongly of the opinion that unless the Food and Drugs Act is rigidly applied to municipalities and local bodies and severe penalties imposed upon adulteration, producer of good milk will always be defeated by the unscrupulous middleman or hawker and he will not get reasonable price for his pure milk. Propaganda for more consumption of milk should be preceded by reasonable guarantee that pure milk will be supplied to the public.

57. The question of Containers, whether, they are for milk, butter, ghee or other milk-products may appear to be a small matter, but it is best that some attention is paid to design suitable containers of different capacities, of standard pattern, for different purposes, with a view to ensure sanitary storage and to prevent fraud and adulteration. The names of the pro-

ducers should be noted on labels attached to the containers, so as to fix the genuineness of the article contained on the producers.

Animal Husbandry Wing of the Board of Agriculture in India.

58. The attention of the National Planning Committee is invited to the proceedings of the third meeting of the Animal Husbandry Wing convened under the auspices of the Imperial Council of Agricultural Research in February 1939 and to the recommendations made therein. The Ministers of Agriculture from Provincial Governments and Indian States and their technical experts met a conference held at Simla in May 1937 to discuss matters of policy relating to cattle improvement in India, and passed a number of resolutions, which were later on sent to the Animal Husbandry Wing of the Board of Agriculture for detailed consideration and report.

59. The first resolution was that, in response to His Excellency's appeal for provision of funds for the purchase and maintenance of breeding bulls in a sustained manner and with a continuity of policy for improving Indian Livestock.

- (i) There should be in each Province, a Provincial Livestock Improvement Fund, including donations and Government grants for use in the improvement of stock within the district wherein the amount was collected;
- (ii) The Central Government should make a substantial grant to the Provincial Funds;
- (iii) A Livestock Improvement Board should be set up in each Province and State with local and district branches;
- (iv) The Ministers should be closely associated with the work of the Improvement Board and the administration of the Improvement Funds; and
- (v) suitable arrangements should be made for the maintenance of the Breeding Bulls.

60. The second resolution was that, with a view to secure

systematic and progressive improvements in grazing areas and in the conversion of waste lands into grazing areas.

- (i) There should be set up in each Province, a Provincial Fodder and Grazing Committee;
- (ii) The Central Fodder and Grazing Committee at Delhi should be in touch with the Provincial Fodder and Grazing Committee;
- (iii) Forests and waste lands meant for grazing should be controlled regarding periods of grazing and the number of cattle admitted to the grazing area, as control of grazing areas was essential for producing hardy, young stock and as poorest cattle were found in areas where grazing was unrestricted; and
- (iv) definite schemes of experimental work must be ensured by the Central and Provincial Fodder and Grazing Committees and by the Forest Departments.

61. The third resolution was that there should be an independent Livestock Section and a Livestock Expert in each Province and that arrangements should be made to train adequate staff of supervisors and stockmen to work under him.

62. It was also resolved that the touring Veterinary staff entrusted with the duty of taking preventive measures against epidemics in village areas, should render substantial assistance in Livestock improvement work.

63. Another resolution was that, in all crop planning experiments, production of fodder crops should find an important place and that an intensive system of cultivation of fodder under irrigation should be encouraged.

64. It was also resolved that the Minister for Agriculture should have control of Plant Husbandry, Animal Husbandry,

Veterinary, Marketing and Rural Co-operation Departments, each working under suitable Technical Heads.

65. The above resolutions, adopted at the Ministers' Conference, were circulated to all Provinces and Indian States, and the action taken in each Province and State was revised at the third meeting of the Animal Husbandry Wing held at Delhi in February 1939. It was ascertained that most Provinces and States had already taken action in some of the above directions and that it was in contemplation to take full action in the near future. It is worthwhile pointing out that quite recently the Govt. of Madras appointed a Livestock Improvement Committee consisting of officials and non-officials.

66. The Sub-Committee on Animal Husbandry and Dairying of the National Planning Committee agrees with all the above resolutions and would like to emphasise that speedy and immediate action should be taken by all the Governments and States.

Dr. Wright's Report.

67. Dr. Wright's report on the improvement of Animal Husbandry and Dairying in India was issued only three years ago and the Sub-Committee invites the attention of the National Planning Committee to this report (vide Appendix.) He has drawn freely - and rightly too - from the report of the Royal Commission on Agriculture in India, in his findings and recommendations, with regard to which action is being taken by all Governments. The Sub-Committee agrees with his recommendations regarding the necessity for the grading up of the present cattle by better breeding with selected indigenous animals, for the production of pedigree animals for distribution to the villagers, for the carrying on of researches on animal nutrition and for doing propaganda amongst the villagers in the clean handling of milk and milk products. He suggests that a new Dairy Research Institute, within easy distance of Delhi, should be started, for specialised research -

work on Dairy Bacteriology, Dairy Chemistry, Dairy Technology and Dairy Husbandry, utilising the present Imperial Dairy Institute at Bangalore and the proposed Creamery and Research Institute at Anand as sub-stations, and that the investigations of dairy problems should be taken up simultaneously in all Agricultural Colleges which should be expanded so as to undertake the teaching of the I.D.C. course. The importance of ghee in the Indian dietary, to which Dr. Wright makes reference, is realised, but the Committee wishes to point out that there is need and also scope in several localities for the manufacture of several by-products which are now imported into the country.

68. The attention of the National Planning Committee is invited to the Report of the Expert Cattle Committee of Bombay (vide appendix) which deals in a practical manner the lines on which the problems of animal husbandry and dairying can be tackled. The importance of this report lies in the fact that the Expert Cattle Committee was set up by the Bombay Congress Ministry a few months before they resigned. Its terms of reference are similar to those issued by the National Planning Committee, and the findings of the Committee, though particularly referring to the Bombay Presidency, are generally applicable to all provinces and states, who may, with advantage, set up similar committees to make recommendations, suitable to particular local conditions.

69. The Committee makes definite proposals for breeding of different types of animals for different parts of the presidency, commercial dairy cattle, essential draught animals, dual purpose animals, commercial daily buffaloes etc. While the Government is expected to start breeding in a number of centres with a view to produce pedigree animals for distribution, a practical scheme for cattle breeding and milk production on co-operative lines is also suggested. Starting with village societies, consisting of a group of 5 villages,

and capable of supplying no less than 3000 lbs. of milk daily. An affiliation of these societies to rural creamery centre is suggested which should undertake the collecting, processing and distribution of milk to urban areas. The co-operative society will supply selected breeding bulls to the villages and help in purchasing selected cows of good milch capacity. When there is surplus milk, the rural creameries should undertake the manufacture of milk products like skim milk powder for which there is scope in certain localities.

Principles of Animal Nutrition and the Feeding of Cows & Calves

70. The food of cattle consists of roughage and concentrates. As cattle have four stomachs and are accustomed to chew the cud, they require considerable amount of bulky food. This bulky food or roughage may consist of grass, green fodder, straw, hay or ensilage.

71. Grass is nature's provision as food for Livestock and may be said to contain the necessary food constituents in a more or less balanced ratio for growth. A detailed scientific study of the different kinds of grass growing in grazing areas and forests, and a determination of their relative nutritive values is essential, and must be undertaken in Government Institutions.

72. Green fodder consists of agricultural crops, cereals like Joma (Sorghums), maize and Oats or pulses like lucerne, bersee and sunu hemp or special grasses like Guinea grass, Napier grass and elephant grass. They are usually grown under irrigation and several cuttings are obtained in a year, and the fodder must be cut at the time of flowering or just before flowering, as the nutrients will be translocated to the seeds, if the plants are allowed to ripen. A certain quantity of green fodder is essential for milch cows, and it is advantageous to add a small quantity of the more nutritious leguminous fodder to the usually supplied cereal fodder. One of the essential points to be noted by a dairy farmer is to

growth of fodder under irrigation, and, he will find that in the long run, it is the cheapest food for his cattle.

73. Straw : consists of the dried stems and leaves of cereals left over after the grain is harvested; and, as the plant nutrients have largely concentrated, during the ripening period in the grain, straw is the least nutritious of the roughage given to cattle. Paddy straw and Jonna straw are the straws usually stacked in rural tracts.

74. Hay consists of natural grasses cut in grazing areas or of artificially irrigated fodder, dried in the sun and stored as hay stacks. Great care must be taken to cut the grass before it runs to seed, and it is sometimes inconvenient for the villager to do so, as the agricultural harvesting season coincides with the grass cutting stage and, as the harvest of agricultural crops cannot be delayed, it is best to cut the grass earlier. Hay making can be done when the weather is fine and the sun is hot. The drying may be hastened and to a certain extent controlled, by stacking the green fodder or the grass on sloping bamboo frames kept in wedged shaped form or tripods, spaced by poles. The preservation of a hay in hay stalks is the best and cheapest method of storing roughage for cattle for use in times of draught and famine.

75. Ensilage : When weather conditions do not admit of hay making, all edible green grass and fodder are stored in deep pits or specially constructed silos and kept covered up for some months. A certain amount of fermentation sets in, producing sweet or sour ensilage much relished by cattle. There is a small amount of wastage on the outside of the silos. Fermentation is produced by the joint action of water and air. In hay making, fermentation is arrested by the exclusion of water, and in ensilage making, by exclusion, or ten times partial exclusion, of air; and a succulent roughage is the result.

Concentrates consist of edible oil cakes, the husks of pulses and the brands of cereal grains and are valued for

for their contents of protein, fat, carbo-hydrates and crude fibre. The feeding with concentrates is regulated by milk supply and requires adequate attention.

76. Nutritive ratios : Foods are valued by the relative proportions of protein, fat, and carbo-hydrates contained therein, and the nutritive ration (N.O.) is represented by the formula,

digestible proteins.

digestible fat x 2.5 plus digestible I carbo-hydrates.

Milk, the perfect food for growth, has a N.R. of I:4. Some of the concentrates, like groundnut cake have a very narrow N.R. while others like brans have comparatively a wider N.R. Bulky fodders have a wide N.R. and have, therefore, the poorest nutritive value. The nature of concentrates and fodder fed to animals will naturally depend on their availability in each locality and the cheapness of cost thereof. When a mixed ration is indicated for particular animals and for particular purposes, what should be aimed at is, that the desired Nutritive Ratios are maintained.

77. All animals require a minimum ration which is called the maintenance ration, to keep them in good conditions without loss of weight. Additional food of suitable kinds should be given according to their needs. In the case of cows, this additional rations will be regulated by the quantity of milk yielded by each cow. A cow yielding 20 lbs of milk must have a richer supply of concentrates with a narrower N.R. than a cow yielding only 10 lbs of milk. The maintenance ration should have a N.R. of I:12 to I:14. A milking animal will have a N.R. from I:5 to I:7 according to the yield of milk. A pregnant cow also requires additional food for obvious reasons. The amount of casein and lactalbumin of butter fat, and of lactose contained in the milk must come from the protein fat and carbo-hydrates of the food. A complete metabolism of the food constituents takes place in the body of the animal.

The food-carbo-hydrates are oxidised first and they are said to protect the food-protein and the food-fat. The fat of the food is not absorbed as such and stored as body-fat, but it undergoes considerable decomposition. The entire casein and lactalbumin of the milk must come from the food-protein, and nutrition experiments carried out in other countries show that more than 50 per cent of the body-fat or butter-fat is derived from the break up of the food-protein. The necessity for feeding milch cattle with foods rich in protein, in other words rations with a narrow N.R. is self evident.

78. The care and feeding of calves of both cows and buffaloes deserves more careful attention from cattle breeders. Unlike other countries, where calves are weaned from birth and artificially fed by the hand, calves are weaned from birth and artificially fed by the hand, calves are allowed in India to suckle their mothers through the entire lactation period. It is worthwhile considering whether calves may not be weaned from their natural food of milk, after they are two or three months old and artificially fed with skim-milk and gruel. Gruel sights can be seen, in cities like Madras, of calves not being sufficiently well fed from the udder of the cow or receiving any artificial food as a substitute for its natural food. The entire milk to the last drop is drawn by the cowherd for sale, leaving only the exhausted udders for the calves to strike their heads against. It is to the advantage of the cowherd to feed the calves properly, as it will be an asset to him, not only for rearing healthy, future progeny, but also for their fetching a higher price.

79. The importance of oil-cakes has been indicated, and they should, therefore, be retained in the country, for use edible cakes as protein-food and non-edible cakes as nitrogenous manure, The export of oilseeds as such should be restricted but after extraction, the oils alone should be sent out of country.

A Necessity for Research on Animal Nutrition .

80. Some work has been done by Agricultural Chemists all over India, but what has been done is so little compared to what has yet to be done. The following points require detailed investigation and research :-

The evolution of Feeding Standards and fixing up of Rations for different purposes have been done in other countries, and based on such researches and on their application, better Livestock have been produced. Wolff's or Kellner's Feeding Standards may not be strictly applicable to India, with its different climatic and temperature conditions.

- (i) What are the kinds of cattle foods and kinds of fodders and of grasses available in different parts of the country ?
- (ii) What are the compositions of these foods and fodders, and their nutritive values so far as contents of protein, fat, carbo-hydrates, crude fibre, minerals and vitamins are concerned ?
- (iii) The necessity for careful experiments to determine Digestive Coefficients (true and apparent), Starch Equivalents, Calorific values and Nutritive Ratios of foods ?
- (iv) What are the feeding standards for calves, young animals, bulls, working cattle, heavy draught animals, milk-production, fattening animals, wool-production and egg-laying ?
- (v) What are the maintenance rations for different kinds of Livestock and what are the rations for different purposes ?
- (vi) What are the nutritive rations, feeding standard rations for cattle, buffaloes, sheep, goats and poultry?
- (vii) What are the relative merits of different oil cakes-groundnut cake, linseed cake, gingally cake, safflower cake, cotton seed cake, and rape seed cake

cake and other concentrates, like cotton seed, crushed pulses and husks like dholi, black-gram, horse-gram and cluster beans, brans from wheat, rice and other cereals?

(viii) Is there not need to conduct experiments, as in other countries on Metabolism as regards protein, fat, carbo-hydrates and minerals.

81. All these above points should not be considered as merely academic but they are of practical application. We have lived long enough by empirical methods and by traditions. Just as we realise the need for better social amenities as a result of scientific knowledge and application of scientific results in other lines, we should also recognise the necessity for the introduction of scientific methods in the management of our Livestock and in the production of milk and in the manufacture of milk-products. This subject has received scanty attention so far. With the equipment available in most Agricultural Colleges, a student has no more than three or four chances during his whole course of handling a separator or a churn. Even this facility does not exist in most of the Veterinary Colleges.

82. In several countries of the world, special attention has been devoted to the improvement of Animal Husbandry. In some countries, Animal Husbandry receives even greater attention than Plant Husbandry, and the income from animals is often greater than the income from agricultural crops. Animals receive special treatment, according as they are meant for production of milk or fattening for meat. So far as India is concerned, Animal Husbandry has until now held a subordinate place to agriculture proper. It is a side branch of the Agriculture Department. It may be safely stated that not more than one-tenth of the resources of the Agricultural Department, in the shape of staff, and funds, is used for the improvement of Livestock. A glance at the syllabuses and time tables of Agricultural Colleges will show what amount of theoretical instruction and practical training is given to the students of these colleges in Animal and Plant Husbandry

respectively. So far as Veterinary Colleges are concerned, more attention has been paid to the treatment of animals in disease than to regular improvement of animals in health. Staff entrusted with the management of Livestock have been transferred from the Agricultural to the Veterinary Department and vice versa, and little concentration of work on Animal Husbandry has been done by particular staff specially trained in this line.

83. The solution is the appointment of Livestock Experts, specially trained in Animal Husbandry, and entrusted with the specific duty of improving Livestock in the country, as rapidly as possible. It will be an advantage to have the Director of Agriculture, the Director of Veterinary Services and the Livestock Expert, all working under one Development Minister. Livestock Experts have been recently appointed in several Provinces and Indian States, and they work under the orders of the Director of Agriculture in some cases under the Director of Veterinary Services in others. All Governments are alive to the importance of the development of Animal Husbandry and considerations of economy apart, it must be conceded that vigorous and sustained policy will be followed only when the Livestock experts have an independent responsibility and outlook and have their own stock-men and supervisors, specially trained for the purpose to work under them.

84. Improvements in Animal Husbandry and Dairying have to be tackled in different ways, and there is work therein for Governments, for Cooperative Organizations and for villagers themselves. Researches of all kinds, starting of large scale industries, financing and subsidising of cooperative organisations and of villagers' efforts, and provision for technical skilled help are within the purview of the State. Cooperative organisation is apparently the best solution for most of our problems in Animal Husbandry and Dairying. Cooperative organisation is essential for starting societies in villages,

for the better breeding of animals, for the collection of milk, for the manufacturing of milk into milk-products, for the transport of milk to and distributing the same in, urban areas and organizing Central Societies in towns for the purpose.

85. Efforts of Government institutions and of cooperative organisations will not bring about satisfactory results either in breeding or in milk production, unless and until the villagers for whose benefit such efforts are made are persuaded to take up all practical lines of the suggested improvements.

86. Education of village folk.

The first essential for successful dairy farming, whether on cooperative lines or not, is the education of the villager to adopt clean habits of life, and incidentally to adopt hygienic methods in the handling of milk and milk-products. The routine work in a village is manifold. The cattle stalls and surroundings have to be kept clean, and farm-yard manure - dung urine and litter, - has to be properly conserved. The cows and calves have to be washed, grazed and fed. The milking utensils, whether metallic vessels of brass, aluminium or tin, or mud pots and village churns, have to be cleaned with boiling water and daily exposed to the sun. Personal cleanliness is essential and clean well-washed clothes must be worn. The hands, up to the nail-tips, must be scrupulously clean and an all-round cleanliness must be maintained in the village homes. All these can be effected without additional expenditure. What is required is a change of slovenly habits and cleaner outlook of life. This can be done by education and propaganda, which must be undertaken by village guides, who have received some elementary instruction in a diary, especially in the clean handling of milk and milk products. Such course should be of short duration open to educated middle class young men and women. As women folk and in the villages deal with the feeding of animals and the handling of milk, the help of educated women as

milk guides is indicated. Educated women, with a certain amount of leisure and a spirit of social service, will be most helpful in this propagandist work. Apart from using their knowledge of improved dairying in their own households, they could teach practically the uneducated women in the village how to handle milk and carry on dairy operations in a sanitary manner. Animal Husbandry and Dairying must be considered cottage industries in the sense that they give occupation to the villagers throughout the year, irrespective of agricultural seasons.

87. The sub-committee would like to make the following recommendations, to popularise animal husbandry and dairying in the country and to impart a rural bias to the children:-

(i) That elementary books on animal husbandry and dairying written in Indian languages, be introduced in rural schools.

(ii) that scholarships, sufficient to cover living expenses, be awarded to children of agricultural class to undergo elementary training in recognised dairies, the course to extend about 3 months and the instruction to be given in the mother-tongue of the students.

88. (2) Regarding cows milk or any milk to be consumed in the quantities desired by the public, it is essential that pure supply is secured. The distribution of pure milk is very important. The Committee is very strongly of the opinion that unless the Food and Drugs Act is rigidly applied by municipalities and local bodies and severe penalties imposed upon adulteration, producer of good milk will always be defeated by the unscrupulous middleman or hawker and he will not get a reasonable price for his pure milk. Propaganda for more consumption of milk should be preceded by reasonable guarantees that pure milk will be supplied to the public.

"Drink More Milk" Campaign.
Britain

89. The Government in Great Britain felt the need for starting a "Drink More Milk Campaign", although the consumption of milk per head of population is very much greater than in India. The Daily Telegraph issued, four years ago, a Special Supplement, copiously illustrated, and containing messages from Ministers and Experts. The propaganda conveyed in this Special Supplement may be summed up in the following abstract:

"Milk is the food of foods. There is nothing superfluous or injurious in milk. It is the most healthful drink and food. It is difficult to think of any development, which will bring greater benefit to the nation as a whole than the increase in the consumption of milk. It contains the two best of all the protein known to Chemists, Casein and Lactalbumin. It contains the most digestible of all the known fats. It contains six vitamins with their protective powers against deficiency diseases. It supplies all the necessary salts for growth. It contains all these food constituents in perfect balance. It has been evolved by nature for the development and growth of all the mammals, of which mankind is the masterpiece. No milk; no man. It was your first drink whoever you are & it will be your last drink".

When propaganda of this kind is considered necessary in countries, where cleanliness in the handling of milk is ensured and pasteurised milk is drunk directly from bottles both by young and adults and where already the average milk consumption is great, the necessity for doing such propaganda amongst Indian population is self-evident. Let us also produce clean, healthy milk and start a "Drink more milk campaign". In view of buttermilk being a bye-product of ghee industry in this tropical country, its use as a general drink should be encouraged. The same applies to separated milk also.

90. Smaller or bigger herds of cows and she-buffaloes are maintained by cattle owners within Municipal areas or at short distances from towns, for production and sale of milk in urban areas. The Polson's Factory at Anand manufactures butter and casein on a large factory scale, while Private Dairies have installed pasteurising and refrigerating plants for the manufacture of butter. Cream separators and improved churns are also in use for the preparation of butter for the market in several cities and in villages.

Manufacture of By-products of Milk.

91. Assured of a daily supply of about 100,000 lbs of milk from the surrounding villages, the Polson's Factory at Anand manufactures and sends out daily, 4,000 lbs to 5,000 lbs of butter packed in tins and packets and several cwts. of casein packed in gunny-bags. The establishment of such a large scale Factory not only requires a large initial capital on buildings, plant and machinery and entails considerable recurring charges and working expenses, but is limited by the availability of very large quantities of milk within easy reach. There is room, however, and plenty of scope, for starting factories on smaller scales than Polson's Factory, capable of producing from 300 lbs to 1,000 lbs of butter daily with facilities for packing, apart from the processing of skim-milk into suitable by-products. These small scale factories may be undertaken by Government or private concerns of individual capitalists or Joint Stock Companies, or may be managed on cooperative basis by Cooperative Rural Creameries. Just as there are Factory Inspectors to supervise the working of other factories, there must be qualified Factory Inspectors to inspect private and cooperative Dairies, from time to time, to ensure that up-to-date sanitary methods are adopted therein. Licences issued to these Dairies should be liable to be withdrawn, when working is not satisfactory and hygienic methods of handling milk and milk-products are not followed.

92. Messrs. Kirloskar Brothers, the well-known implement Manufacturers of Bombay, state that they will be able to manu-

manufacture Cream separators of different sizes and sundry dairy equipments in their works at Kirloskarwadi, at popular prices, if there is a demand for improved dairy appliances in the country; and that, as the parts required for their manufacture are simple and can be made in India, it will pay them to undertake mass production.

By-products of milk.

93. The first and most important use of milk is its direct use for human consumption in liquid form. The surplus milk will be utilised in the Rural Cooperative Creamery for preparation of butter, which may be used as such or converted into ghee. The preparation of butter and ghee under hygienic conditions is most important, as they are used so largely as foods and are in great demand all over the country and fetch good prices. Good butter and unadulterated ghee are the first need of the country and the first by-products of Dairy Industry.

After the removal of the butter, the first by-product of the Creamery is skim-milk, sometimes called Separated Milk. This contains all the food constituents of milk, except butter-fat, namely the valuable proteins, casein and lactalbumin, lactose or milk sugar, the mineral salts and vitamins. Skim-milk can be used directly in liquid form as food, and this has been proved to have advantageous results in the experiments carried out by Dr. Ackroyd in the feeding of school children whereby substantial increases in weight and height have been noted in them. Skim-milk will also find its place in tea shops and in making ice-creams. It has its use for feeding calves, when they are weaned, as suggested, when they are two or three months old. Skim-milk will, however, be more largely used for making curd and butter-milk. Curd and butter-milk are extensively used in every Indian household, and the poorer classes of people, who often go without it, must be encouraged to make greater use of the cheap butter-milk in their diet and it may be said that this will be partly ensured, as long as milk is handled in Rural Creameries.

94. When there is a surplus of skim-milk beyond local requirements for direct use as skim-milk or for conversion into curd, the surplus can be manufactured into suitable by-products. Which of these by-products can be taken up in the Rural Creamery will depend on the quantities of surplus skim-milk available every day. The preparation of casein, lactose, skim-milk-powder, condensed milk, preserved milk and khoa and milk-sweets will then receive due attention.

95. While the Sub-Committee is of opinion that there is scope for the preparation of the above by-products under the conditions mentioned in the previous paragraphs, the sub-committee feels at the same time that there is a necessity for a detailed investigation into the methods of preparing these products under the conditions prevailing in different parts of India and specifying the localities where the manufacture of each of these by-products can be undertaken, and this investigation must be made by Government in their research statistics. The initial attempts at manufacture may not produce by-products of as good quality as those now imported, but experience and continued investigation will lead to final success. The Cooperative Rural Creameries are probably the best agencies to undertake the manufacture of by-products of milk, but Government Institutions should also help by experimenting and advice. A small Committee of three to five members which should include a qualified practical Dairyman might be appointed, with advantage, to report on the subject of manufacture of all by-products of a Dairy Industry.

Manufacture of ghee.

96. Unless the cost of production of milk is appreciably reduced, it will not be economical to the villagers to manufacture ghee for sale to the public at a reasonable price. By increasing the yield of milk and improving its quality, the cost of production of milk and butter will naturally become less; and these in turn depend on improvements in breeding and feeding.

97. Just as cow's milk is preferred for drinking, cow's ghee

of its being more easily digestible; and it often fetches therefore, a higher price. As buffalo's milk has higher fat content, it is more economical, therefore, to prepare ghee for large scale production and consumption from buffalo's butter. The long established method of manufacturing butter from fermented whole milk or whole-milk curd will always continue, but improvement should be made by immediately preparing butter from fermented cream as Creamery butter gives a better quality of ghee.

98. Ghee is an important article of food in the dietary of the Indian population, and the consumption of ghee depends on income level, and poor people often go without it. The present high cost of production of milk and of butter makes ghee costly, and adulteration on an extensive scale is practised all over the country, both in towns and in villages; and the punishments awarded by convicting Magistrates are not sufficient deterrants against this practice. Vegetable oils, hydrogenated oils and animal fats are the usual substances used for adulterating ghee. Each of these adulterants is by itself a wholesome food, but is nowhere equal to ghee as a nutrient.

99. All edible vegetable oils are used in cooking all over the country, each kind of oil being more largely used in localities where it is produced, e.g. so far as the Madras Presidency is concerned, co-coconut oil is freely used in Malabar, groundnut oil in South Arcot, Gingelly Oil in the Southern Tamil districts, and the Northern Telugu districts and safflower oil in the Ceded districts. It is a matter of individual liking and taste that people get accustomed to some oils and do not appreciate the taste and flavour of other oils.

100. Hydrogenated oils are edible vegetable oils which have been chemically treated, so that the liquid glyceryl esters of unsaturated fatty acids like oleic acid have been converted into solid glyceryl esters of saturated fatty acids. These hydrogenated oils have been labelled and sold as vegetable ghee. The term vegetable ghee is a misnomer, and legislation is required to prevent the naming of hydrogenated

oils as vegetable ghee. Just as oleo-margarine, which was once called artificial butter is now labelled only as oleo-margarine, and sold as such, the hydrogenated oils should be named as hydrogenated oils or solid vegetable oils, but not as vegetable ghee or artificial ghee. To guard against deception, hydrogenated oils must be coloured with a harmless vegetable dye other than yellow which is the natural colour of butter or the colour imparted to it in dairies with the annato-dye. To call these hydrogenated oils as ghee is most misleading and must be prevented by suitable legislation;

101. Animal fats have been used in cooking by those accustomed to non-vegetarian diet and, in this sense, are wholesome food, but the use of animal fat in adulterating ghee which is consumed by vegetarians, is revolting to the religious sentiments of the vegetarian population, and such adulteration should, therefore, be absolutely prohibited.

102. The rancidity of butter is due to the careless handling of milk and butter, the storage of butter for several days and insufficient heating or overheating. The Casein entangled in butter is largely responsible for producing rancidity, helped, on the one hand, by the water in the butter which hydrolyses the glyceryl esters by which the free volatile fatty acids like butyric acid - which have a bad smell - are liberated, and, on the other, by atmospheric oxygen, which oxidises the fats, producing bad-smelling oxidised products. Cleanliness is the keynote for the manufacture of wholesome ghee, and considerable attention must be devoted to this aspect in the proposed Rural Co-operative Ghee Centres.

103. Food analysts have adopted laboratory methods of analysis to detect adulteration, and Dr. N.N. Godbole of the Benares Hindu University has recently devised some new methods, suited to Indian conditions, to determine the degree of adulteration with various adulterants, which deserve experimenting in all laboratories.

104. The usual method of curdling milk is to add some sour milk to warm milk overnight. Sometimes the sour milk is spoilt, and consequently the curd and also the butter manufactured from it. It will be an advantage if standardised starters are made available at Rural Creamery Centres.

S H E E P.

I05. It is estimated that not less than 50 million sheep are kept in India, but there is no systematic attempt at breeding. Flocks of sheep are maintained by shepherds of nomadic habits who take their sheep from place to place, according to the availability of grass in new grazing areas, or according to the demands from cultivators for sheep-penning of their agricultural lands. Sheep industry is, therefore, in the hands of people, who are ignorant of the trend of modern developments. Neither the Government nor the public have given much attention to the problem of sheep-rearing. The foremost need is to have a systematic survey of the existing indigenous breeds and the sheep tracts. A closer study of environments & types of animals should be made by persons who are thoroughly conversant with sheep-breeding. Sheep are valued as much for mutton as for wool and the education imparted to Agricultural and Veterinary graduates gives them little insight into sheep-breeding or wool-classing. The Government should, at once, undertake this work of training and sheep-husbandry at an Institute, fully equipped for the study of sheep and wool.

I06. There are some good breeds of sheep all over the country; e.g. in Mysore and the Ceded Districts, and, therefore, also immense possibilities of improvement in breeding by selection of indigenous sheep. The extreme variation seen in the wool-coat of the sheep is a fair indication of the chance it would offer in selection, and this would be followed by the individual study of different types and the mating of desirable animals. Good feeding is essential for individual selection, as animals exhibit maximum possibilities of development, only when they are adequately nourished. Feeding of sheep with concentrates is unknown in India.

I07. The introduction of exotic breeds should also be undertaken, and the spread of these animals should be done -

with caution and under the supervision of experienced organizers. The trials with exotic breeds should be made at Government Experimental Stations; and the movement of these animals to suitable tracts should be undertaken only when the trials have been successful. There should be a guarantee of continuity of work in sheep breeding as in every other country.

108. Each Province should have a Central Farm in its best sheep-breeding tract; and should have a few sub-stations to introduce improved breeds. Flock-owners in the vicinity of the sub-stations should be persuaded to organize themselves, with a view to maintain types of sheep, akin to the improved flocks kept at the sub-stations, and a certain system of subsidising should be undertaken.

109. Considerable attention has to be paid to the production of wool and to its marketing. It is estimated that 86 million lbs of wool are produced annually in India, but a considerable proportion of the fleece of wool is of small length and often an admixture of wool, hair and dirt, so that the income to the shepherd from the sale of fleece is very small e.g. one Kampli or coarse blanket is all that is given in exchange for the fleece of 50 sheep. The wool produced in India is largely consumed for village handicraft and manufacture of coarse blankets, although a small portion is exported. For manufacture of woollen cloths in the few mills established in India, wool is imported from other countries, chiefly Australia, and the imports in 1938 amounted to about 9 million lbs. of wool and 3 million lbs of yarn. There is always a great demand for woollen clothing in certain parts of India, and there is no reason why, with such a large sheep population in the country, India should import the raw material, apart from finished woollen goods, and why India cannot become self sufficient with regard to its requirements in wool and woollen goods, and possibly become an exporting country as well. Improvement in sheep-breeding is the first

requisite, and a study of the qualities of wool, the production of a better and cleaner quality of wool and proper grading of wool should receive simultaneous attention, along with marketing facilities.

II0. The Agricultural Department of Bombay has a well-equipped sheep farm at Poona. Crossing of local sheep by Merino rams imported from South Africa has been done in several parts of the country, with satisfactory results. The grading up of indigenous breeds by Merino rams has proved very successful in Mysore, where Sheep-Breeders' Associations have been organized, machine shearing has been introduced, grading of wool is done and arrangements have been made for the better marketing of wool and kamblis, all with the initial help of the Agricultural Dept. of that State. The Government of Mysore also maintains sheep-breeding stations from which F-1 and F-2 generations of cross-bred rams have been distributed to the villagers. It is also stated that the average weight of 2 clippings of wool per year was about 10 lbs. for Merinos, 3 lbs. for Cross-breed and less than 1½ lbs. for country sheep.

III. The Sub-Committee recommends that (i) that sheep breeding stations should be established by Governments of all Provinces and Indian States in selected localities, (ii) that help should be afforded to private shepherds by provision of suitable rams, by castration of indifferent male stock and by improved methods of shearing of fleece (iii) that facilities should be afforded in the grading and marketing of wool, by co-operative organizations, as far as possible and (iv) that suitable grants be given to the shepherds at reasonable concession rates, if possible by initial free grants, with^a view to help them to produce better breeds of sheep and better quality of wool along with a larger yield of fleece.

G O A T S.

II2. Goats may be considered as the poor man's cheap milk animal. Goat's milk is highly valued for human consumption, but the yield of milk from goats is very small, as kids are allowed to roam about with the mothers and suckle the -

milk from the udder through the day. There is no recognized goat breeding in India. Stray goats are maintained in every village, the goats trespassing all over the village and nibbling at every green stuff.

113. Improvement in goat breeding can be done by importing he-goats from recognized milk breeds. One of such breeds is the Kamori breed of Sind, Black or fawn in colour, possessed of a well-developed body and characterised by long pendulous ears; the she-goats of this breed kept at Poona give an average of 4 lbs of milk per day, which is really a substantial increase to the daily income of villager. The American Arcot Mission, Katpadi, has already distributed a few he-goats of Junnaguri and Goorti breeds. Government goat breeding stations are necessary, and the distribution of good breeds amongst breeders and villagers is also essential, followed by small financial assistance, from time to time. The Sub-Committee commends the proposal of the Imperial Council of Agricultural Research to import Angora goats as a nucleus for a future mohair industry, following the return of an officer who had been deputed from India to study the breeding of the Angora goats and the Mohair industry. The Angora, goat, originally indigenous to Asia Minor and accustomed to live in dry climates, subsist to extreme variations of temperature, was introduced during last century into suitable regions in South Africa. The produce of Mohair for a single season amounted to over 27 million lbs of fleece valued at over £ 2,000,000/-. The Angora has been successfully reared in U.S.A. There is a great demand in India for Mohair, for textiles and other manufacturers, as it is a strong fibre, taking dyes easily.

POULTRY.

115. Poultry-keeping has received a fair amount of attention in all Provinces and Indian States. All Agricultural Colleges maintain a Poultry-yard, and most Governments and Indian States maintain Poultry Breeding Stations. The Government of India has recently published an elaborate report on the Marketing of eggs, after an elaborate survey in the whole country.

The importance of poultry in India may be judged, from the fact that, domestic consumption apart, it is estimated that 60 per cent of hen eggs and 80 per cent duck-eggs are sold every year to the value of over 5 crores of rupees, the value of the birds themselves being estimated at $7\frac{1}{2}$ crores of rupees.

116. Desi fowls are small birds with an average weight of about 3 lbs. kept in most houses in each village and subsisting on worms and scraps of food from dung heaps and back-yards. They lay eggs of small size at irregular seasons, the average production per year being 50 to 60 eggs. The egg contents are highly concentrated protein and the hens should, therefore, be well-fed with nutritious food. The egg shell indicates the need for mineral salts, especially of calcium.

117. The introduction of superior breeds has, so far, produced satisfactory results in grading up the Desi breeds. Government Institutions have introduced cockerels of improved breeds with advantage; and have distributed selected eggs for laying and selected chicks for rearing. Many Missionary Institutions and Y.M.C.A. centres have undertaken poultry work as a characteristic activity of rural reconstruction schemes. The work at Marthandam, in Travancore, is highly commended, not only for producing and distributing improved poultry, but also educating the villagers all-round. The Government Poultry Farm maintained at Poona is a good example of how a poultry station can be started and managed, and attention may be drawn to the provision made here for the training of future poultry breeders. Punjab Government has a central poultry station at Gurudaspur with half a dozen sub-stations in different parts of the Province. Indigenous fowls are selected and graded up, foreign breeds have been introduced, and both indigenous and foreign breeds are multiplied and distributed to the villagers.

118. All kinds of improved breeds of poultry, cockerels and hens, have been introduced into the country and have got acclimatised in different places and are worthy of further trial and adoption. According to reports received, the Leghorns seem to thrive everywhere. The eggs are usually more than double

the size of eggs of Desi fowls and a larger number of eggs are produced in a year. The importation of cockerals of superior breeds has been found beneficial and must be persisted in.

119. The trouble in poultry-keeping is that there is often a sudden outbreak of disease, causing the death of a large proportion of fowls and chicks. The diseases have not been apparently well-studied; and better preventive measures must be evolved and demonstrated.

120. The per capita consumption of eggs per annum is 296 in Canada, 154 in Great Britain and 8 in India. This is due, largely, to the bulk of the population having acquired vegetarian habits, who object to the eating of any food containing life. There are infertile eggs, however, having no life, which may be consumed. Such eggs can be examined by candling.

121. While hatching of eggs by the hens sitting on them is the usual phenomenon, hatching in incubators under controlled temperature conditions have been successful in several places and deserves to be further experimented on and demonstrated in all poultry stations. Egg production may be said to be gradually increasing in the country, but grading and marketing arrangements for sale of eggs would bring in an increased income to the villager. Suitable poultry houses with wire netting are essential, and proper feeding must also be attended to. In this connection, we should like to draw attention to a small, portable poultry house, designed at the Telankhery Farm and exhibited at the Faizpur National Congress. The parts are easily detached and can be properly disinfected, and the poultry house protects the birds and chicks from infectious diseases, rain, cold and sun, and can be made for a sum of Rs.15/-.

122. We would like to invite the attention of the Planning Committee to the above mentioned report on the marketing of eggs in India published by the Government of India, for all

the detailed suggestions made therein. For further improvements in poultry farming in India, the following recommendations may be made:-

1. Give subsidies and practical aids to villagers to keep improved stock and adopt improved methods.
- ii. Widespread introduction of poultry and egg marketing centres on cooperative lines, so as to reduce the disparity between the price received by the producer and the price paid by the consumer.
- iii. Encouraging trade in dried and liquid egg, for export, in those areas where there are sufficient poultry to keep the plant supplied with fresh eggs for processing.
- iv. Introduce poultry pathology as subject of instruction in all veterinary colleges by the appointment of a whole-time poultry pathologist for teaching and research.
- and v. Poultry keeping is a cheap cottage industry, requiring the attention of the villagers during all seasons of the year, and, as such, it must be fostered by Government in all possible ways.

BEE-KEEPING

123. The use of honey, as an article of diet and as a vehicle for medicines, has been recognised in India from time immemorial. Such honey has been gathered from beehives inhabited by wild bees in the forests. Apiaries have been introduced in several countries, where domesticated bees have replaced the wild bees and bee-hives are kept near dwelling houses. Bee-keeping may be considered as a cottage industry, in localities where food is available in the shape of flowers for the bees to gather the honey from, in all months of the year. Bee-keeping has been successfully established in several parts of India, and elaborate proposals are under consideration for the extension of bee-keeping in the Bombay Presidency. Bee-keeping and the distribution of hives has also become a regular feature in several Y.M.C.A. centres. The work of the

Government Entomologists' section at Coimbatore deserves special mention. Careful investigation and study is carried on at the Insectory at Coimbatore into the habits of the wild and domesticated bees. Bee-hives have been introduced in several villages in most districts, demonstrations are given from time to time, and several agricultural demonstrators in the districts have received some special training at Coimbatore. A Honey Week is celebrated once a year for demonstration and popularisation. The honey produced from the apiaries is pure and fetches a high price. The supply is not equal to the demand.

The cost of the hives is very small, but it is advisable to get the honey extracted from the hives with proper equipment whereby superior honey can be obtained without spoiling the texture of the hives. The Co-operative Centres can also arrange for the collection and sale of honey and bees' for the benefit of the villagers.
