“REGULATIONS UNDER THE DAIRIES, COW-SHEDS, AND MILK-SHOPS ORDERS.”

By J. MITCHELL WILSON, M.D.,

County Medical Officer of Health for the East Riding of Yorkshire.

It is always a matter of deep interest for those who have acted as medical officers of health for a number of years to note the gradual evolution and advance of any branch of public health work. It is now thirty years since the Public Health Act of 1872 first originated any real sanitary work in this country. But it is the Act of 1875 which has been our sanitary code, and the foundation of all the work engaged in for the protection of the public health during the last quarter of a century; yet every year since then has shown that new Acts and extended powers have become necessary, just as the public has been satisfied that there has been a need for, and a reasonable hope of good results following from, the putting in force of such additional powers.

The same process of building up and perfecting our public health system still goes on, as more confidence is placed in the sanitary authorities, and new duties and responsibilities are being placed upon them. The origin and progress of legislation affecting the milk-supply trade is, I think, a typical example of the spirit and procedure I have just noticed. In a very tentative way, the Contagious Diseases (Animals) Act of 1878 was an acknowledgment that the conditions under which the milk-supply of the country was carried on deserved some consideration. For several years before it had been shown almost to the point of demonstration that milk had acted as the carrier of the infection of enteric fever, scarlet fever, and of diphtheria. The details of the inquiries made of the several outbreaks, especially those referred to by the late Ernest Hart in a well-known paper, showed that not only grave sanitary defects existed on the premises from which the milk was sent, but that either ignorance of, or indifference to, the risk of the milk becoming a carrier of infection was the rule. Every succeeding outbreak gave the opportunity of spreading more enlightened views on this subject, and of enforcing the need for some supervision of the milk trade. The divergent views on this question of the milk seller, especially in rural districts, and the milk consumer in the towns, have been two obstacles ever present to worry the zealous medical officer of health.

There is no spirit of boasting in stating the fact that the whole

progress of this work has been due to the efforts of the local medical officers of health, rather than to any *vis a tergo* from the central department. The Contagious Diseases (Animals) Act of 1878 conferred upon the Privy Council powers to make general and special Orders on matters affecting the supply of milk, and from that date a beginning was made in supervising the conditions under which the milk trade is carried on. At that time the matter was hardly considered one to be supervised by all the public health authorities; for outside the municipal boroughs the carrying out of the new powers was entrusted to the authority of the justices, and the administration to the county police. The Orders of the Privy Council were to provide for the registration of persons carrying on any branch of the milk trade, for inspecting the sanitary conditions of the dairies and cowsheds, for securing the cleanliness of the premises and milk-vessels, and to prescribe precautions for protecting milk against infection. The first Order under the Act of 1878 was issued the following year, and is known as the Dairies and Milkshops Order of 1879. Although extensive powers were conferred by that Order, yet outside the large municipal boroughs no great progress was made in securing better sanitary conditions in and about cowsheds or dairies. Persons were registered who occupied premises which in many, if not in most, particulars fell far short of a reasonable standard in the matters of ventilation, lighting, and water-supply.

A further Order was made by the Privy Council, known as the Dairies, Cowsheds, and Milk-shops Order of 1885. It is the powers and provisions of that Order with which we are now immediately concerned. To complete, however, this short history of the legislative measures: The powers of the Privy Council of making general or special Orders under Section 34 of the Contagious Diseases (Animals) Act of 1878 were transferred to the Local Government Board by the Contagious Diseases (Animals) Act of 1886. The Local Government Board, immediately after the transfer, issued a supplementary Order, which made it clear that the transference of the powers to them also authorized the infliction of a penalty for any neglect to comply with the requirements of the Order made in 1885 by the Privy Council.

Article 15 of the Order of 1885 provides that if at any time disease exists among the cattle in a dairy or cowshed the milk of a diseased cow therein shall not be mixed with other milk, and shall not be sold or used for human food. In 1899 the Local Government Board issued an amended Order, which extended the list of diseases under the Contagious Diseases (Animals) Act of 1878,

so as to make it apply to all diseases of the udder in cows of which the milk is offered for sale. The fact that such disease exists is to be certified by a veterinary surgeon.

The recommendations of the Royal Commission on Tuberculosis relating to cowsheds, byres, etc., are most important. We may well take their decisions as standards by which to try the requirements of the regulations we are considering. And we ought to remember that the members of that Commission were representative of the landed interest as well as the medical and veterinary professions.

The Order of 1885 provides that a local authority may make regulations—

For the inspection of cattle in dairies.

For the prescribing and regulating the lighting, ventilation, cleansing, drainage, and water-supply of dairies and cowsheds.

For securing the cleanliness of milk-stores, milk-shops, and of milk-vessels used for containing milk for sale.

For prescribing precautions to be taken by purveyors of milk and persons selling milk by retail against infection or contamination.

Some of the smaller councils have been unwilling to adopt any regulations owing to the permissive nature of the powers. But every council is definitely required by the Order to keep a register of persons who carry on the trade of cowkeeper, dairyman, or purveyor of milk, and such register is from time to time to be revised and corrected. Again, a building is not to be occupied for the first time as a dairy or cowshed until the reasonable requirements of the council are satisfied as to the lighting, ventilation—including *air-space*—cleansing, drainage, and water-supply of the premises; and as regards premises occupied previously, even they must be kept at all times in a state necessary and proper—

- (a) For the health and good condition of the cattle;
- (b) For the cleanliness of milk-vessels; and
- (c) For the protection of the milk against infection.

These compulsory requirements upon every district council necessitate some inspection and supervision of the cowsheds, dairies, and milk-shops, apart from any regulations. Further, it is essential that the district council shall agree upon some standard of what lighting, ventilation, and means of water-supply for new premises they will consider to be satisfactory. Similarly, the district council must be the judge of the standard for premises previously in use

as cowsheds, and which are to be suitable for the health and good condition of the cattle, etc.

Therefore, if the district councils are to carry out the requirements of the Order, some regulations must be made.

The Local Government Board have issued a model set of regulations, and as all local-made regulations have to be submitted to the Board, the wisest plan is to adopt those officially prepared, with such modifications as may be thought necessary.

The Report of the Royal Commission on Tuberculosis contains a recommendation which finds no place in the regulations of the Local Government Board, nor is it referred to in the circular letter from that department *re* cowsheds to district councils. It is as follows :

“That in future no cowshed, byre, or shippon other than those already registered shall be permitted or registered in urban districts within 100 feet of any dwelling-house ; and that the discontinuance of any one already existing shall be ordered on the certificate, either of the medical officer of health that it is injurious to the health of human beings residing near it, or of the veterinary inspector that it is not a place wherein cows ought to be kept for the purpose of milk-supply, and that it is incapable of being made so.”

The situation of a cowshed is not set out as one of the purposes for which regulations are to be made, but I would remind you that accompanying the model bye-laws for slaughter-houses, issued by the Local Government Board, there are some valuable suggestions offered as to the requirements and suitability of any site on which it is proposed to build or license a slaughter-house. Similar suggestions may be offered for cowsheds, and the recommendations of the Royal Commission might well be considered when new premises are being placed on the register.

We all know cowsheds so wedged in among other buildings, including dwelling-houses, that the best methods and care in cleansing do not prevent inconvenience and a nuisance to the neighbourhood. The suggested distance is probably too great to enforce, but 30 feet from any building, either a house or a workshop, could be adopted. I think a reasonable standard would be obtained, and it would also secure means of through ventilation for the cowshed.

The material of which cowsheds are to be constructed is regulated by the building bye-laws in force in the district referring to new buildings. The ideal is that the inner walls to the height of 5 feet should be formed of such a smooth, impervious material as will assist in frequent cleansing.

There is first the regulation for the inspection of dairies and cowsheds. Under Section 4 of the Contagious Diseases (Animals) Act, 1886, the local authority and their officers, for the purpose of enforcing the Orders made by the Local Government Board and any regulations made by a local authority, have the same right of admission to any dairy or cowshed as is given by Section 102 of the Public Health Act, 1875, for the inspection of nuisances. In those districts where the Infectious Diseases Prevention Act, 1890, has been adopted, Section 4 gives the medical officer of health additional power to inspect dairies and cows in his district if there is evidence that any person is suffering from disease attributable to the milk. Outside his district similar inspections may be made, but only when power has been first obtained by a justice's order. Medical officers will do well to consider that this power is limited by the requirements of the Contagious Diseases (Animals) Act, 1886, in the matter of visiting any shed where it may have been declared to be an "infected area."

Further, many Corporations have obtained powers under private Acts to prevent the sale of milk from cows suffering from tuberculosis, whether within or without their boundaries, under the well-known milk clauses. So far as districts outside the municipal boundaries are interested, if the medical officer has reason to believe that milk from any dairy situate outside the city or borough from which milk is being sold is likely to cause tuberculosis in persons residing within the city or borough, provided that the medical officer of health has first obtained an order from a justice having jurisdiction in the place where the dairy is situate, he may, if accompanied by a qualified veterinary surgeon, at all reasonable hours enter the dairy and inspect the cows kept there.

Probably the most important regulation is the very comprehensive one which prescribes the lighting, etc. The model series requires that every cowshed shall be sufficiently lighted with windows in the roof or the sides. We are here at the very outset met with the difficulty arising from the want of a definition as to what is to be deemed to be sufficient. Every part of a cowshed should be lighted sufficiently to secure the health of the animals, and also to enable an inspection to be made of its condition. Windows are now provided, but owing to want of cleaning, breakages, etc., the amount of light is considerably reduced. I greatly favour that the largest amount of the light shall, wherever possible, be obtained from the roof. I know no better method than to supplement windows in the walls by a number of glass tiles

placed over every stall. I recently inspected a new cowshed in a rural parish, with stalls for sixteen cows, where the means of lighting was exceptionally good. Along the whole length of the tiled roof there were placed three rows deep of strong glass tiles. Each of them measured 14 inches by 9 inches. The light was therefore distributed throughout every corner of the shed. Far more frequently we find that all the light available is obtained from one or two openings in the front wall of the shed, measuring 3 feet by 4 feet; but only the upper third of that space is used as a window, as the other two-thirds are commonly made use of for what is known as a "hit and miss" louvred ventilator. The regulations for lighting might, therefore, be improved if windows were required both in the sides and in the roof, wherever the latter is possible. Some reasonable standard, such as 2 square feet of windows or glass tiles per cow, might be required.

Article 13 of the Dairies, Cowsheds, and Milk-shops Order of 1885, which empowers a local authority to make regulations, specifies among others "The ventilation," but no mention is made there about air-space. It has been held, however, that as Article 8, which lays down the conditions on which any cowshed is to be occupied, mentions among others that of ventilation, "including air-space," therefore a local authority are justified in prescribing a standard of air-space. The report of the Royal Commission suggested "that a minimum cubic contents of from 600 to 800 cubic feet should be provided for each adult beast, varying according to the weight of the animals. Also, that there should be a minimum floor-space of 50 feet for each beast in every *populous place*, whether urban or rural." Further, the same conditions recommended for a populous place should apply to sparsely populated places, except as far as cubic contents per cow are concerned.

The model regulations issued by the Local Government Board after the report of the Royal Commission do not adopt the literal suggestions contained in that report, but endeavour to make the difference apply not to populous or sparsely populated districts, but to the varying opportunities given for daily turning the cows out of the sheds. One standard is laid down which applies only to those sheds where the cows are not turned out, and it is left to the local authorities to set up any other standard for those sheds where the cows are turned out of the sheds during some part of each day.

It is a cause of regret, and entails much difference of opinion among local authorities and their officials, that some definite guide or regulations for all classes of cows are not prescribed. The setting up of one standard for cows which are housed under the

conditions which town life necessitate is often being accepted as applying to cowsheds in districts where the surroundings are vastly better. A great hindrance is therefore being placed in the way of any regulations being adopted by some councils, and where these have been made there is much lukewarmness in requiring them to be carried out.

It is the opinion of many medical officers of health in rural districts that the conditions under which cows are usually kept, especially the very marked difference in the situation and surrounding of the sheds, 800 cubic feet are not required to insure the animals being kept in good health, and this must be the standard to which this part of any proposed regulations must conform. I am disposed to think that too much stress has been laid upon securing adequate air-space, to the exclusion of providing a definite standard of the methods which would secure adequate ventilation. The requirement—"a sufficient number of openings into the external air to keep the air of the cowshed in a wholesome condition"—is little or no guide to assist either a cowkeeper or a district council. Let me again ask you to consider the recommendations of a part of the report I have previously quoted: "While we have prescribed a minimum cubic contents and floor-space without mentioning definite dimensions affecting ventilation and lighting, we are distinctly of opinion that these are by far the most important, and that requirements as to cubic and floor space are mainly of value as tending to facilitate adequate movement of air."

Every set of building bye-laws prescribe that every habitable room not provided with an open fireplace shall have a sufficient aperture or air-shaft of a sectional area equal to from 80 to 100 inches. There is here laid down a guide for ventilation for human beings, and some such standard should be prescribed for each cow occupying a shed. I find Dr. Barwise has suggested 36 square inches per cow in his model regulations for the county of Derby. Without some definite standard, we find that ventilation is provided (sometimes enough, sometimes far too little) by the upper half of doors left open only during the daytime, by a number of tiles being raised a few inches above the ridge of the roof, by all or a portion of the tiles being left unpointed, by sliding louvres, more often found shut than open, or by a row of drain-pipes being built into the wall. Some reasonable and practical arrangement should be arrived at, say, by requiring Dr. Barwise's standard—*i.e.*, to provide for each cow 36 square inches of permanent openings, to be provided, one half in the front external wall, the other half in the wall above the head of the cow, or in the ceiling at the oppo-

site side of the shed to the inlet opening. There should be the minimum for every shed, and in many sheds very much more ventilation will be preferred by the tenants who have carefully thought out this subject. I recently inspected premises where the cows, when not in the fields, were housed in a covered shed with only three protected sides. For animals so kept Nature provides the warmer winter coat; but it is noteworthy that among animals housed in stuffy, badly-ventilated sheds the usual extra protection of a change to a thicker winter coat does not occur.

During my inspection of many cowsheds in urban and rural districts, and as I have ascertained from the amount of air-space suggested by other medical officers, I am of opinion that a minimum of 600 cubic feet is a reasonable one where definite means of ventilation are provided, and where the cows are turned out during a portion of each day.

My friend Dr. Cameron, Medical Officer of Health for the counties of Elgin, Nairn, and Banff, sends me a copy of regulations just sanctioned by the Local Government Board for Scotland in October, 1901, under the Order of 1885 and the amending Order of 1899, for the boroughs of Dufftown and Grantown, in which it is required that every cowshed shall be provided with a minimum air-space of 600 cubic feet.

I think we may safely follow this lead of the Scottish Department.

The regulations as to air-space are discussed at meetings of farmers' clubs and associations of milk-producers, and it is right we should learn their views. Landlords are also specially interested, and in framing regulations which primarily affect the tenant, it is upon the owner that the cost of proposed alterations to meet the new requirements must fall.

The chairman of one of these meetings in Cheshire recently stated "that as to air-space, he considered there should be a general rule in the county. In one Union they wanted 500 cubic feet, in another 400, in another 450, and in another 800. They required proper ventilation, but he did not think so much air-space was wanted." If a standard of 600 cubic feet is adopted, it will necessarily reduce the cost of any new building by one-fourth, as compared with the requirement of 800. And we are more likely to carry all the conflicting interests with us if we adopt the more moderate and reasonable standard.

If you will bear with me going into further particulars, I think the following details, obtained in visiting some cowsheds in the

East Riding recently, will give you a satisfactory idea of how the minimum of 600 cubic feet is obtained.

I believe the width of the stall from the front to the rear wall should never be less than 15 feet. That distance is apportioned as follows:

Feeding trough	...	...	...	2 ft. 3 ins.
Length of stall	...	...	...	5 ft. 0 ins.
Manure and urine trench	...	...	...	1 ft. 9 ins.
Gangway	...	...	...	6 ft. 0 ins.

These measurements, I know, differ very much from some proposals I am acquainted with, but they are given as the result of visits to well-planned sheds. I have not made mention of any passage at the cow's head for feeding. I admit it is desirable, but it is not absolutely necessary, and in by far the larger proportion of cowsheds it does not now exist. The distance I have included in that for the feeding-trough and standing room for the cow, together 7 feet 3 inches, is put forward as the best workable measurements if the cows are not to lie in their dung. The width of a double stall is almost invariably 7 feet, and a height of 11 feet 6 inches will give a reasonable height to obtain exits for foul air above the level of the cows.

In considering the ventilation and air-space details, we cannot ignore the well-known objection on the part of the cowkeeper to any alteration which will lower the temperature in the sheds, as this is followed by a lessened yield of milk. This result probably occurs mainly in those sheds where the cows are kept in an unnaturally warm and also foul atmosphere; while in sheds where cows are kept in buildings of adequate size, and provided with sufficient ventilation, the result of a temporarily lessened temperature will be less noticeable so far as the quantity of milk can show. However, our object is to secure milk from healthy cows, and we had better be prepared to pay more for such a good supply rather than less for the poorer and rather larger quantity.

I need not detain you long over the details of cleansing or the drainage of the cowsheds; the requirements usually laid down are only those that every farmer readily acknowledges to be reasonable. In fact, the removal of dung once a day, suggested in the model regulations, is less than the usual practice.

The selection of the months of May and October for lime-washing coincides in the country with the dates of the cows being turned out for the summer and the month they usually return, so that the sheds are scarcely occupied since the previous cleansing. July and December would be more suitable times.

The water-supply is to be "suitable and sufficient"—i.e., for the cows and for keeping the sheds clean. Where a supply of water is laid on from a main the requirements are provided, but well-water is the only source in many rural districts. That supply has in recent years and is still being improved, and more wholesome supplies provided. This wholesome water for household purposes should be recognised as the only supply suitable for the cows. The belief dies hard that cows prefer to drink dirty water rather than clean. If no suitable supply has been provided, necessity compels them to use the sewage-polluted pond-water; but I think the temperature of the water is the chief reason why the cows prefer water which the sun's rays have warmed in the open air, be it dirty or clean, to that freshly drawn from a deep well. A little forethought and a suitable receptacle kept filled in the open air will provide the warmed pure water for the cows.

A great deal has been written comparing the conditions of cowsheds in urban districts with those in rural districts, too often to the disadvantage of the rural cow-keeper. For many years I have been inspecting these places, both in towns and rural districts, over a very wide area, and my experience does not agree with that so frequently quoted. Both in towns and in the country I have had many sheds on the register which were all that any reasonable standard of healthy conditions would require. I have also had, in nearly every district, types of a very opposite kind—small, overcrowded, dirty, and neglected sheds. But that is not the ordinary condition in rural districts any more than it is in large towns. It has also been asserted that milk from the rural districts more frequently contains the bacillus of tubercle than the milk from town-fed cows. If the fresh air of the country has not lost all its virtues, then it is hard to credit that tubercle should be more prevalent among cows which are turned out every day than among those which are never allowed to leave their shed. However, there is some evidence that tubercle is becoming less prevalent in our milk-supplies generally. Dr. Hope of Liverpool, in his annual report for 1900, says (p. 119): "It is only right to emphasize the fact that during the last year the samples of milk taken at the railway-stations on arrival from the country did not appear to be more frequently tubercular than the samples taken from the town." And in October last Dr. Collingridge reported the results of Dr. Klein's examination of typical samples of milk taken on their arrival into the City of London from various parts of the country to detect the *Bacillus tuberculosis*. The results of the experiments showed that in no case was the tubercle bacillus

demonstrated. At the last meeting Dr. Hillier quoted some figures extracted from a report by Dr. Beatty to the medical officer of health for Manchester, regarding 1,006 deaths from phthisis in which there was some information available. Of these a source of infection was detected in 652, in 223 the source was a consumptive relative, in 246 other sources of probable infection are set out. Among all these milk was only traced in one case. If these very satisfactory results have in any degree been brought about by the action of many large towns in obtaining special powers for the inspection of all cows suspected to be suffering from tuberculosis, and of preventing the sale of such milk in towns, then there is a very urgent need that similar powers should be made operative in every district, urban or rural.

The regulations referring to milk-stores, milk-shops, and milk-vessels are mainly relating to surface cleansing; but the water-supply for use in the cleansing of the milk-pails is one of special importance. Although steam or boiling water is to be used at one stage, yet all the water used ought to be "wholesome," rather than "clean," as suggested in the model regulations, and especially so as it is not an unusual practice to cool the milk-vessels with well-water before the work of milking begins during hot weather. One standard, and that a wholesome water, ought to be the only supply allowable for all purposes about a milk-farm, cowshed, dairy, and for the domestic supply.

The precautions to be taken by milk-sellers against the infection or contamination set out in the model regulations are very definite as to the conditions under which milk may be deposited for sale, and they are usually adopted *en bloc*. As to the precautions necessary to be taken on the occurrence of a dangerous infectious disease on premises where milk is produced or sold, we must turn to Article 9 of the Order of 1885. The requirements there set out are sufficient to safeguard the consumers against infection. Most of us have had to consider the question as to compensation from the sanitary authority for the loss (whole or in part) of the cow-keeper who is unfortunate enough to have a case of infectious disease in his family. I have always urged that generous treatment should be meted out to one who has that misfortune, but who is willing and anxious to assist in the measures necessary to prevent the further spread of the disease. This action, I find, is quite in agreement with the terms laid down by the large dairy companies in their terms with farmers who supply them with milk.

I cannot close this short paper without putting before you an

aspect of this question which is often lost sight of. We are most anxious to protect the health of the inhabitants equally in the towns and the country from all possible risk to health through the medium of the milk-supply. Are our regulations in any degree responsible for the fact that during the year 1900 milk and cream to the value of £26,592 were imported into this country, and that £347,727 was paid for condensed milk imported in 1901? We have no security that the sources from which that immense quantity of milk was obtained were in a satisfactory condition. It has almost become a by-word that the children of the poorer classes in the country have little or no milk with their food. What hinders, then, a greater development of the milk trade? Is it that the foreigner, untrammelled by any restriction as to the sanitary conditions of his cowshed and dairies, is cutting out our farmers, or is the latter unwilling to continue a trade in which he is troubled by inspection by outsiders? If this view is in any degree correct, I think every endeavour ought to be made to bring it home to the farmer or cow-keeper as the seller, as well as the public as the purchaser, that all our regulations for every part of the milk trade are based upon advice of many actually carrying on the trade; and that the lodging of animals under conditions conducive to their health and well-being are just the conditions with which the public and sanitary officials will be best satisfied.

DISCUSSION.

Mr. C. B. DAVIES (Secretary of the Cheshire Chamber of Agriculture) said he desired to express his obligation for the opportunity afforded him of hearing the excellent paper which Dr. Mitchell Wilson had given them. The paper was written in a very reasonable spirit, and that fact had pleased him as a farmer very much. He had been somewhat afraid he would have heard some serious demands made in respect of cowsheds that they as farmers would probably have objected to, but the requirements as set out in the paper were extremely reasonable. Farmers were gradually coming to see that it was necessary for them to comply with the regulations being put into operation in respect of their cowsheds. They were becoming alive to the importance of sanitation all round—important not only for human beings, but for cattle as well. At first they were inclined to resent outside inspection, and the consequent expense they were frequently put to, but they were getting over that feeling of antagonism now. Landlords themselves were becoming more willing than formerly to incur any reasonable expense in putting premises in order for their tenants to cater for the growing milk demand. When these matters were dealt with in a reasonable and conciliatory manner by sanitary officials, the time had gone by for farmers to object, and he thought medical officers of health would not have in the future that same cause of complaint as had sometimes occurred in the past. He hoped, however,

that the willingness of farmers to comply with sanitary requirements would not conduce to any unreasonable demands being made on them in the future. He was glad to hear from the paper that evening that any such fear was groundless. The paper admitted that cows expected to give milk should be kept reasonably warm, but he feared that was not possible in the country if 800 cubic feet of air space were required. The air and the winds outside cowsheds in country places were stronger and more penetrating than in urban districts, where adjoining buildings afforded shelter. His own sheds had 620 cubic feet space per cow, and it was only with the greatest difficulty that at times he could keep the sheds warm. He agreed with the paper as to the importance of ventilation—free egress for the foul air as well as ingress for the fresh air. Veterinary surgeons were with them upon this point. They had told him again and again that a large amount of stagnant air above cows' backs was deleterious to their health. When animals were tied by the neck they must be kept warm, and farmers could not keep milking-cows loose. He did not like cowsheds being open to the slates. They seldom saw shippons in Cheshire so constructed. There was usually a loft over with hay stored, and they thought that was better for the cows, as well as a matter of convenience. Veterinary surgeons explained to him that as the air in open-roofed sheds rose to the slates it became chilled, and fell again in that state on to the cows' backs, and was a frequent cause of colds. He did not like the idea of a cow standing with its head to a dead wall. He was satisfied they were better with an open framework in front and a fodder bin: the circulation of the air was freer, the breathing more easy, and the health of the animal better for it. The paper, if he might say so, was scarcely strong enough on the question of water-supply for cattle to drink. It did not go so far as he could have wished. They (the medical officers of health) had an enormous amount of influence in their hands, and he begged them to use it in bringing strong pressure to bear upon owners of farms to provide their tenants with pure water for cows to drink. Everyone who had seen dairy farms in Cheshire and in other counties knew that the sanitary surroundings of drinking-ponds were often deplorable. These ponds were naturally at the lowest point in cattle-yards, and were contaminated with the filth which for ages had been washed down into them. Such water could not be otherwise than injurious to the health of cows, and must interfere with the production of sound, wholesome milk. He trusted that one result of their discussion would be that they would exercise their influence generally in obtaining an improved water-supply to farms where milk was produced for sale.

Dr. MEREDITH RICHARDS said they were, in his opinion, starting on the wrong tack. Dr. Wilson in his paper said it was advisable to boil all their milk. If it was still necessary to boil their milk, all these exertions to improve the cowsheds were to a very large extent lost. It would be far better if they could move in the direction of adopting a better standard for the purity of the milk itself. For instance, there could be a bacteriological standard, and then, again, milk should not be sold that would curdle with boiling if boiled within an hour of purchase. It should also be a penal offence to sell milk from a tuberculous cow. If this was the line taken, the farmer would very soon find a way out of the difficulty. He was much interested in the last speaker's remarks about keeping cows in cool sheds. That did not seem to be the practice in the South of England. In Sussex the milk

did not seem to vary whether the cows were kept in sheds or outside, and one of the largest cow-keepers in his district had adopted a shed with three sides, and stated he was astonished with the result. He did not get so much illness, and the yield of milk was quite as good. He agreed with the last speaker as to water-supply. Every cowshed should be required to obtain a certificate that it has a proper and sufficient supply of water.

Dr. ARMSTRONG was very pleased with the remarks of Mr. Davies. Change of air was commensurate with cubic space, or almost so. They could not have proper change of air without adequate cubic space. The question of air space in relation to temperature was a very important one. He knew a man of great experience who had expressed the opinion to him that there should be artificial warmth in cowsheds, and, if necessary, that the cow should be sheeted. In 1878 or 1879, when the Dairies and Cowsheds Order was under consideration, he worked hard to secure 800 cubic feet at Newcastle, and he got it, too. He did not agree with Mr. Davies as to hay in lofts. Hay should not be exposed to the exhalations from possible tuberculous cows. He was sorry to hear Dr. Wilson's view of the passage-way. With regard to the statistics that Dr. Wilson referred to relating to consumption, this was not only a question of consumption, for it was not consumption that was generally spread by milk, but other forms of the disease. As to the purity of the water-supply, cows drank strange things, and would not always drink pure water from choice. He had seen them drink urinous water and rain-water laying in their own footprints in preference to pure water. He desired to say to Dr. Wilson and others that rural populations lived very largely by urban populations through the sale of milk, and therefore urban populations had a right to demand that the conditions of cow-life should be very favourable. He adhered to his opinion that 800 cubic feet should be the minimum amount per cow.

Dr. KAYE said in the West Riding of Yorkshire the farmers said "we only sell milk to our neighbours," or "we only make butter, and therefore do not come under the Dairies and Cowsheds Orders." He would like to hear the opinion of members as to whether Article 5 exempted them only from registration or from the regulations entirely.

Mr. SHIRLEY MURPHY was interested in the point raised by Dr. Richards as to keeping cows in the open and not suffering any loss of milk. He was told that some years ago by a number of farmers, but it was not a universal opinion. In some counties they were kept in the open much more than in others. The cow in the open kept in better health, and the supply of milk was not diminished. If farmers would come round to that way of thinking, it might be a solution of the whole question. The tendency was to put a cowshed in a close and confined place, to exclude the light because the flies would get in, to exclude the air because the temperature had to be kept up. These were just the conditions which in the human subject produced tuberculosis, and he could not but believe that they would be likely to produce similar results in the cow. Then there was the question of milking. In this country it was not usual to wash the teats before milking the cow, nor to wash the hand of the milker before commencing to milk. He had within the last few weeks seen two or three cows milked; the cows' teats were dirty, the hands of the milkers were dirty. Only one had clean hands, and those had been washed by the milk running over them into the pail. He looked at the pail and found

pieces of excrement floating on the milk. It was quite easy for the cow to be washed and the milk to be cleansed. It was a matter of education of the people dealing with milk-supply, and he was of opinion that conditions of cleanliness ought to be required by law, and a penalty imposed for the neglect of such conditions.

Dr. KENWOOD thanked Dr. Mitchell Wilson for his excellent paper. All his recommendations appeared to be such that they could agree with; but it seemed to him that if these recommendations were put into effect they would have cowsheds in a sanitary condition, and everything healthy and sound except the cows, which would remain in the same filthy condition in which they were frequently found at present, and to which Mr. Shirley Murphy had just called attention. It always seemed to him they were beginning at the wrong end. He had to inspect a very large number of cowsheds in his district, and the direction in which he wanted his committee to move was that of insuring that the cows in such sheds should have their teats washed before being milked, and that they should be groomed at least once a day. There was no difficulty in that. It was not done simply because it was not a custom. It was a matter in which the Society might take some action. They groomed horses, but the animal from which they obtained their milk-supply was allowed to be caked in manure and filth from the cowshed. It was all very well to say a cow should have a certain cubic space and have ventilation in the wall, but the air ought not only to be sufficient in quantity, but also in quality; and what always struck him about rural cowsheds was that they were generally built on three sides of a square, in the centre of which for at least six months the manure was stored. The ventilation openings in the sheds surely ought not to face that seething mass of manure. He moved that it be referred to the Council to consider the advisability of taking steps to secure the daily grooming of cows and the careful washing of teats prior to milking.

Dr. DAVIES seconded the proposition.

Dr. NEWSHOLME said the resolution was not appropriate until after the Royal Commission now sitting had reported. If anything was to be done, he hoped it would be in the direction of Dr. Richards' remarks. If they got clean milk, it was a matter of little moment whether it was obtained by 400 or 600 cubic feet of air space. He would be prepared to let everything else go if they could get (1) a standard of cleanliness, so far as amount of deposit of solid matter from milk was concerned; (2) a bacteriological standard, indicating the maximum number of bacteria permissible in milk in summer; (3) a temperature standard, which would insure the proper cooling of milk, and its maintenance during transit in this cooled condition.

The PRESIDENT said they ought to have not only pure water, but a sufficient quantity to enable the farmer to cool the milk down to such temperature as would prevent its going bad on the way to the consumer. The question of the purity and sufficiency of water was a very important one. He remembered a case where a medical officer of health had the water at a dairy examined, and found the sewage of the house going into the well. The milk itself had also been watered from the same source. The farmer subsequently obtained his water some half-mile away, and carried it to his farm. He (the speaker) took a sample of this water, and found it was simply full of ammonia, and he discovered that it had been carried in the barrel previously used for taking manure from the cowshed to put on the land. They would have to educate

the people in the matter of cleanliness in a very elementary manner. The discussion had been a very useful one, and he did not see why they should not formulate their own view on the matter, and, if necessary, give evidence before the Royal Commission.

The motion was then put to the meeting and carried.

Dr. MITCHELL WILSON, in reply, said if there was one thing more than another he was anxious for, it was to insure a good water-supply. If they got a wholesome supply of water, they would have made a considerable advance. He had been interested in hearing from Dr. Richards as to cows that had been housed outside in sheds, and he was pleased to know that the idea was likely to become more common. He agreed this was not only a question of tuberculosis. They could not expect healthy milk except from cows healthy in every respect. Replying to Dr. Kaye, he was of opinion that such cases as those he had quoted were not liable to be registered, but were subject to all the other regulations.

PRIZES FOR MILK HYGIENE.—The Hamburg Exposition of Milk Hygiene offers thirty-one prizes for the best method of cleaning bottles, for the best contribution on the subject of modifying milk for infants, of keeping milk, sterilizing, etc.; also for popularly-worded pamphlets on these subjects.

STERILIZATION OF MILK WITH HYDROGEN PEROXIDE.—A series of experiments were made on this subject by Harriette Chick (*Centbl. Bakt. u. Par.*, 1901, No. 20), using a 3 per cent. solution of the hydrogen peroxide. It was found that 0.2 per cent. of the peroxide was sufficient for the complete sterilization of milk, and that the addition of 0.1 per cent. sufficed to keep milk sweet for a week or so. It appeared to make no difference with sterilization whether the milk was freshly drawn or whether it had been allowed to stand some time so that fermentation had commenced. The peroxide, however, imparted a disagreeable, stinging taste to the milk, this being noticeable even in as dilute solutions as 1 part of peroxide to 10,000 of milk. The results, therefore, are considered unfavourable to the use of this material in milk for drinking.

AIR-SPACE IN COWSHEDS.—It is of interest to record the views of agriculturalists themselves as to the amount of air-space that should be provided in cowsheds. At a meeting held near Northwich in Cheshire on November 11th, under the auspices of the Cheshire Milk Producers Association, this question was under discussion. Mr. W. C. Richmond, Lord Barrymore's agent, considered the amount of air-space required by the authorities in Liverpool, Manchester, and other large towns as altogether excessive, and he expressed the opinion that 400 cubic feet for each cow was more than sufficient. The chairman of the meeting, Mr. George Egerton-Warburton, advocated one uniform regulation for the whole county, and stated that what they wanted was not so much air-space but proper ventilation, and that if they had too much air-space the shippens became cold, and there was less milk produced. In another part of the country dairymen were cautioned not to keep their cowhouses too warm, as the cows were debilitated thereby, and liable to chills and tuberculosis; they were advised to give them as much air as possible.