### FOUNDED 1866

whether or not the Where private the municipality steurizing plant. as or more im-

all cows shall be by the tuberculin right to protecontamination, by er than that from eurized. Further, as a right to rect him from poshbors' unhealthy nfected dairy bycheeseries. This those by-products ory. Prof. Van h which he calls ake animals im-

roper contract ilk producer and

thing about the , butter, cheese. apply and should case of milk. If else will follow. problem.

r-General for the st available), we of deaths in the ne years 1897 to hs for all ages, Of this number, under one year. the total average the total deaths 31,290, of which ed under the age eaths under ' one mmunicable diss. and 852 were diseases of the stive system, ich means, cases, deaths ed by impure

n cities, out of a l death rate, of ges, in 1904, of 2, 2,268, or over per cent., died r one year, and, hese, 364 were diseases of the stive tract.

hese figures are cient to show the large death rate this Province ng children under year, and espey in cities, where one-quarter of leaths are among ess infants.

he Deputy Regis-General and ealth, Dr. C. A. tion, says : "A be done by this a securing a pureadvantages will on of our cities viding for them ents are making gration to this much as they pulation, who are f earnest appeals taining consumpt be wiser and f tuberculosis by and meat supply t is doubly tr worth a pou

## **JANUARY 2**, 1908

### THE FARMER'S ADVOCATE.

drink. would seem that carbonated milk might easily be made a fairly popular beverage.

The writers think that carbonated milk might be useful on steamships, where it would keep sweet for several weeks. It may also be found useful in hospitals, and in feeding children where ordinary cow's milk does not digest well.

In the preparation of carbonated milk, the milk must be drawn in as cleanly a manner as possible, be promptly cooled to 45 degrees, and be carbonated in a few hours. In case of not being able to carbonate the milk soon after it is drawn, it should be pasteurized before carbonating. All essels must be sterilized before use.

Some of the conclusions are :

The carbon dioxide gas, forced into the milk under pressure, prevented the development of lactic-acid organisms, or, in other words, prevented the milk souring. In the case of pasteurized milk carbonated, the samples kept for five months, with little increase of acidity. Fresh whole milk, carbonated, kept in one experiment for about the same length of time. This milk was kept at temperatures varying from 35 to 70 degrees F. H. H. D.

# POULTRY.

### THE PRINCIPLES OF ARTIFICIAL INCUBATION.

In the whole field of agricultural science there is no more perplexing problem than that of artificial incubation, its closest rival in interest being the problem of artificial milk extraction. While the principles of incubation appear to be simple, and a large number of incubators have been invented that have given phenomenal results in the hatching of chickens, and, while the incubator and brooder, have come to be regarded as economic necessities where poultry is kept on any scale, and especially where early-hatched chicks are desired for market poultry, on the other hand there is no denying that the average percentage of chicks hatched from eggs set under hens is considerably higher than the average percentage from eggs incubated. Moreover, on almost, if not quite, every large poultry farm that has been running for any considerable length of time, a peculiarly fatal disease called white diarrhea appears among the incubator-hatched chicks, and on some plants kills them off by the bushel. It is not contagious, as proven by the fact that hen-hatched chicks, placed in the same brooder with incubator-hatched chicks, have remained immune, although a quarter, half or three-quarters of the latter were attacked and killed. The characteristic symptom of the disease is non-absorption of the yolk; the precise cause or causes nobody knows, although it has been demonstrated that thrifty, vigorous stock are less liable to lay eggs which will hatch out chickens predisposed to the But there must be specific causes in the disease. artificial incubation itself, and Prof. W. R. Graham, of the Ontario Agricultural College, Guelph, has been working for half a dozen years or more, with little or no assistance from other For stations, in order to find out these causes. the first three years or so he thought the trouble was, the brooding, but, having since proven it was, the incubation, he has used thousands and ands of eggs, and numerous makes of incuhous In 1906 he bators, experimenting on this line. secured the co-operation of Prof. W. H. Day, of the Department of Physics; Prof. Harcourt, of the Department of Chemistry; and Prof. Edwards, of the Bacteriological Department-all of the O. A. Prof. Day has given special attention to the physical principles of incubation, and his address last winter before the Poultry Institute at Guelph, though complex, and necessarily somewhat technical, was of considerable interest to students of the subject. During the summer of 1907, the investigation has been continued, with the accidental discovery of some apparent facts that promise At the Winter Fair, last practical results.

From the experience we have had, it month, he gave an address, outlining the method and results of his work, a summary of which ad-dress, especially prepared for "The Farmer's Ad-vocate," appears beneath. While rather abstruse to the amateur poultryman, whom we caution not to jump to conlusions, we give space to it for the especial benefit of our more fully-informed poultry readers who are anxious to know the latest word of science

> The incubator is in the trial stage to-day. Sometimes it is a success, sometimes a failure. know intelligent farmers, with considerable knowledge of poultry, who have tried it and discarded Experience of years has shown that, on the whole, it has thus far fallen short of the hen in results. To try to find a reason or reasons for this, the Poultry Department of the Ontario Agricultural College began, in 1906, a study of the principles of incubation, inviting the Departments of Physics, Chemistry and Bacteriology to Believing that artificial incubation, co-operate. if it is to be successful, must reproduce the essential features of the natural process, our first efforts were directed toward ascertaining exactly how a hen hatches eggs. A proper temperature has long been recognized as one essential feature. But are there not others? Prof. Dryden, of Utah, has already called attention to the fact that in the nest of the sitting hen there were several times as much carbon dioxide as in ordi-This we verified. Is the carbon dioxnary air. ide essential? Then we asked, what about moisture; is the air in the nest dry or moist; is its humidity high or low? By a special hygrometer designed for the purpose, we discovered that the humidity in earth nests, where the hen hatches best, is about three times as high as in an incubator run without a moisture pan. Is the high humidity necessary to good hatching? We also discovered that there is more ventilation in the nest than in the incubator. Is this ventilation essential ?

" In 1907 we have tested some of these points. Some incubators were run dry, others with large moisture pans of one kind or another in, the bottom, others with a large tray of buttermilk inoculated with bacteria which produce carbon dioxide, others with buttermilk not inoculated, still others had chemically-manufactured carbon dioxide introduced, and one had all the lamp fumes of another machine passed through its eggchamber. The same individual hens' eggs were used in each test. All dry hatches produced white diarrhœa, but it occurred in only 50 per cent. of the machines moistened by water only, in 25 per cent. of those treated with buttermilk, in none where moisture and Zenoleum or moisture and carbon dioxide were both used, there being only two hatches of the last treatment, and in none where lamp fumes were used. Out of every 100 eggs set, the dry machines gave us 16 chickens The machines with plenty of four weeks old. moisture (water only) gave us 33 chickens the same age; i. e., more than twice as many as the dry. Moist machines, with chemically supplied carbon dioxide, gave us 37, inoculated buttermilk 37, pure buttermilk 37. At this point a bit of luck entered into the problem. One hatch, some of the machines were disinfected with Zenoleum, and these all gave better results than those not disinfected. Zenoleum disinfection was used freely afterward, giving from 44 to 46 chickens four Creoline and Jay's Fluid give similar weeks old. results, according to tests made by later experi

A large tray, full size any practical poultryman. of bottom of machine (if that does not interfere with the working of the machine), filled with sand which is moistened with water as needed, will supply the moisture. Disinfection is secured by washing all the inner parts of the machine thoroughly with a ten-per-cent. solution of the disinfectant before the eggs are set. The percentage results will vary with different environments, stock, etc., but as these treatments have proved of great benefit, first to us, and secondly to several others who have taken the cue from us, we see no reason why they should not be of universal application."

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### WINTER EGG PRODUCTION.

The above old and much-worn, but yet seasonable and perennially interesting subject was discussed last month at the Ontario Winter Fair by L. H. Baldwin, of Deer Park, Toronto, Ont. His first point was housing. Build your poultry house early in the season, and have the roof on in July: He had yet to see a henhouse built in the fall of the year in which there was not a dampness, arising, presumably, from the ground. In the autumn, when first bringing the fowl into winter quarters, keep the windows open and give plenty of fresh air, in order to ward off influenza. Thus accustomed to airy quarters, they will be provided by nature with a good protecting coat of feathers, the same as in the case of a horse or cow not too closely stabled in the fall.

Regarding care and feeding, he urged the selection of a liberal number of layers, so as to admit of the subsequent culling out of birds which show lack of development, constitutional weakness or Aim to get well-developed birds other defects. with vigorous constitutions.

Having secured good birds and housed them well, the next essential is feed. While liberal feeding of layers is necessary, yet, when moving into winter quarters, or especially if changing their quarters, the fowls will sometimes go off their feed, and, to guard against this, it is well to feed rather sparingly at that stage. The ration should afterwards be increased, and, as laying time approaches, give meat. Give also green feed, such as mangels, cabbages, beets, etc. He likes mangels best. He used to feed cabbages, but thinks they sometimes upset the bowels, causing diarrhea. As for sugar beets, the hens didn't like them so well as the mangels [the reason being that they are harder to pick-Supplement the green food with clover Ed.]. chaff, from which they may pick the leaves. uses a good deal of meat and cut bone, and likes the mash as a medium for giving meat food. His system of feeding is as follows : A feed of grain first thing in the morning, then a mash about 10 o'clock (containing a good deal of meat, as a rule) ; in the middle of the day a handful of grain is thrown in the litter to keep them busy, and at 4.30 a good heavy feed of grain is given.

A question was asked from the audience as to whether Mr. Baldwin had meant to imply, by a certain remark in the earlier part of his address, that there was no difference in the laying qualities of breeds; that a Light Brahma, for instance, was Mr. Baldwin reas good a layer as a Leghorn. plied that he had seen a recent statement to the effect that one of the first-published egg records was of a Light Brahma hen that laid 214 eggs in one year. He did not mean to say that all breeds were equally good layers ; he had his own

### WITH CARBON-ESSURE.

York Experiment bove topic in a oulletin is nicely oottles used for tus for carbona arbonated mil

bonated under a n the bottle as a niss two to three pleasant flavor, linary milk. In d milk there is a have had occanated milk as a t as a pleasant menters who heard of the Zenoleum result. bersonal preference, but the most important lac tor was not breed, but strain. on earth nests gave us 52 to 53 chickens the same age out of every hundred eggs set.

"Hence, we must conclude that a great deal of moisture in machines is essential. The carbon dioxide is beneficial, but not essential. Disinfection appears to be essential. Hence, to the principle of proper temperature we must add proper moisture and proper disinfection. Our work on ventilation is not completed. Other experimenters have shown that the eggs should be turned frequently and aired, but possibly the latter will be unnecessary when the ventilation is perfected. "Moisture and disinfection may be applied by

"What would you consider a good average yearly egg record for a flock of hens?" "For a large flock, I should say 130 to 140 eggs would be a good average." One man in the back of the audience said he knew a woman who bought from the store the eggs she set, and her flock of about 100 hens averaged her 190 eggs per year. It is to be feared, however, that this was an estimate, rather than the result of actual count. Many a flock and many a hen that appears in May to be doing a 200-egg business, falls far short on the twelve-month totalling up.



The Dressed-poultry Exhibit at the Ontario Winter Fair.