



STANDARD  
AND COMMERCIAL  
POULTRY CULTURE  
By Artificial Process.

DR. T. B. SPALDING

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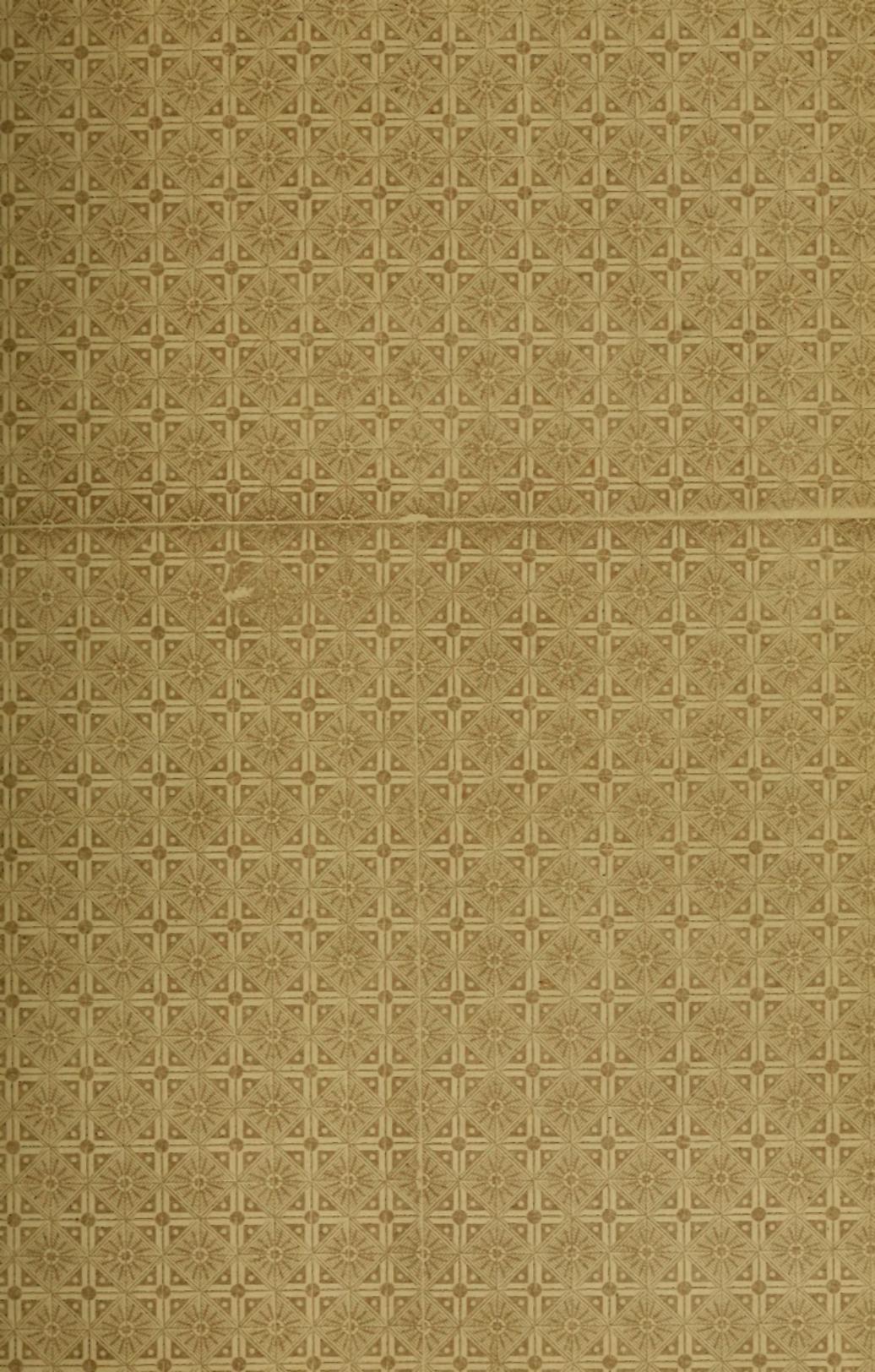


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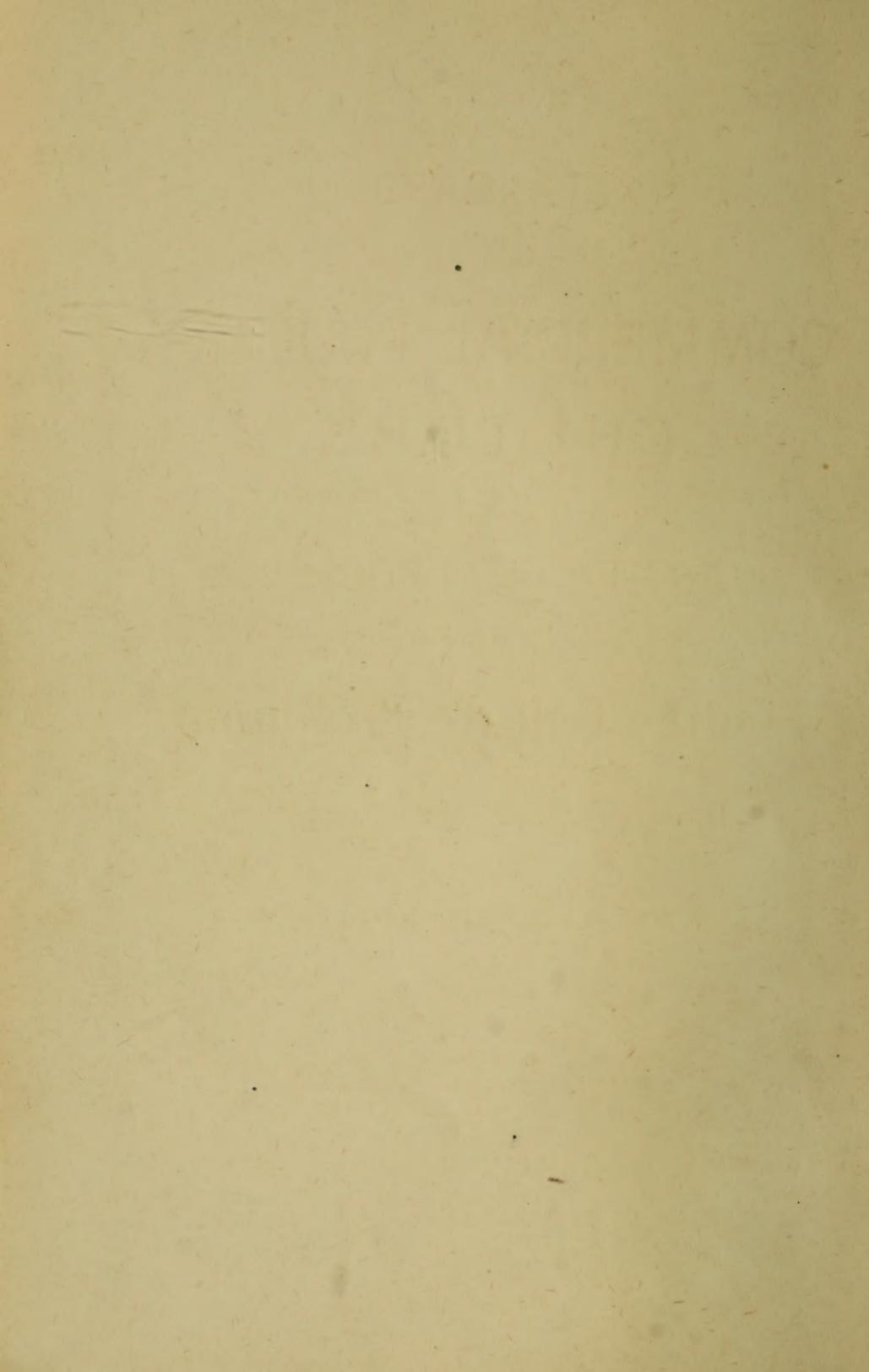
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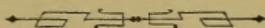
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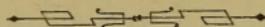
OR, HOW TO MAKE

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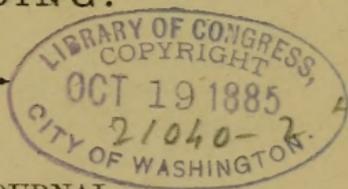


BY

DR. T. B. SPALDING.



CHICAGO,  
AMERICAN POULTRY JOURNAL,  
1885.



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## PREFACE.

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In view of the universal and increasing interest in Poultry Culture and its great and growing magnitude, and the general earnest inquiry coming from everywhere concerning this pursuit, its principles and its profits and remarking the general inacquaintance among the masses with the fundamental facts and plainest principles that underlie and control this industry, as related to, and assisted by modern science, we have thought it essential to success to place before the general public, the new beginner and all who are interested in anyway in poultry, its *underlieing principles*, without a full knowledge of which no one can foresee or shape the issues of his enterprise, and cannot, therefore, wisely decide to engage in it with capital, healthful confidence and assurance of safety. The mission of this book is to formulate such facts and to afford the philosophy upon which they are founded. In other words we aim to offer in clear and simple style the essential principles of Poultry Culture which control and place this important industry upon a reliable business basis. We offer it to all with our fraternal regards and hope that each will be pleased and profited by it and anxious to assist in sending everywhere its fruitful truths by consciously commending its merit,

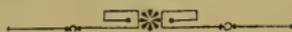
T. B. SPALDING.

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# Standard and Commercial Poultry Culture.



## CHAPTER I.



**P**OUULTRY Culture, though carelessly conducted and scarcely ever studied or sustained by confidence and capital, is yet, the largest, the most important and profitable of any business product of the United States to-day.

Though frequent failures attend the reckless attempts to build vast fortunes from this pursuit at once without capital, without experience and without a just conception of what is required to insure success, yet, we fearlessly affirm that no other avocation on earth will average a larger net return for the time and study, the talent, care and capital involved than poultry culture. We reluctantly affirm that there is no other known industry so little studied and with whose plainest principles the people at large are so generally unacquainted

Wherever an Incubator is operated in public, it is marvelous to note the vast numbers who inquire, "how long it takes the machine to hatch, and how is it possible for the chick to escape from the egg without the assistance of the hen?"

Poultry Culture as a scientific industry is really in its infancy and the idea that *study* and *science* and *principles* are involved surpasses the modest comprehension of many.

Indeed the almost universal idea is that poultry culture, like Di-

vine Grace and Christian Virtues, are all good, and wise, and well as ornamental indulgences, if only one is not asked to study it, to be governed by its principles, and above all, it must not cost anything. Then at once it generates difficulties and doubts and if its claims be honestly advocated and a little pressed, suspicion is started, that though the advocate is doubtless sincere, he is certainly overly sanguine.

*Zeal* is certainly an essential element in the prosecution of any enterprise and he who succeeds in any avocation must, like the intelligent, progressive poultryman, "drink deeply at the well of enthusiasm." The deeper his devotion the more efficient his service and the more he magnifies the merits of his cause.

Poultry Culture, like every other occupation, should be prosecuted as a profession by those who especially love it; for, such an impetus, or inspiration, through all past history, has been the surest guarantee to great success. Thus, from the love-labor, the ardent zeal, or inspiration of Luther, Melancthon, Bacon, Washington, Noah Webster, Franklin, and Fulton, were Religion and Liberty and Literature, and their offsprings, Phylosophy, Invention, the Arts and Sciences all rescued and resurrected from the fog and fable of slumbering ages and given a firm foundation on the high and luminous plain of history. The benedictions that have descended upon the whole human family from the intelligent zeal and service of these sages have covered the world like a mantle of light, have enshrined their names in remembrance that will continue co-eval with all coming ages and perish only with time and the solemn temples and the great Globe, itself.

But, these services, however great, do not discourage nor close the avenues to other altitudes resplendent with rare and equal distinction. Bacon, first of all philosophers that ever lived, broke boldly away from the forms and fashions about and before him, and, tearing the falsehood and flowers from the face of philosophy, he taught and popularized the sublime conception and practical truth, that rather than wrangle amid the vapors and vagaries of metaphysical distinctions, the higher and holier and wiser work for the common sense people of this world is, to learn what is useful first and what is ornamental afterwards—how to earn an honest daily living and how to earn and make good shoes and clothes.

And so, Dear Friends, of all the great questions that crowd and

comfort and confound the age, how little, indeed, of all, or any that is *universally useful* do we really know? In the so-called *learned professions*; the law, the ministry, and medicine, and in agriculture, or the application of science to the furtherance of any of the great business industries—the frequent failures and the universal disaster and distress result from want of practical acquaintance with the essential principles and the details demanded in each respective avocation. There is no saying more trite and true, more sensible and suggestive than that, “The man may wisely be feared who has deeply drank in and digested *one worthy work*.” Rather let me say that thoroughness is advised in every thing.

The purpose, therefore, of these plain and unpretentious pages is to discuss impartially the principles of poultry culture—to place fairly before those who do me the compliment of their careful consideration of a few facts drawn from study and experience in the interest of poultry culture as a profession, because the pertinent questions come up from everywhere, “Will poultry culture on a large scale pay?” In other words, are there any clear and certain principles of universal application upon which the enterprise of poultry culture may be safely and profitably prosecuted and enlarged to commercial magnitude? Are the inherent qualities of the hen, *her diet* for *different duties*, and *her diseases*, and the *exciting* and *predisposing causes* that contribute to all her ills yet known? There are sure and sensible preventives, and, are there high and hopeful hygienic laws that relate as reliably to fowls as to the human family? Can the principles and proper mating for *market* and for *ideal standard specimens* be confidently prescribed, and can ovulation in hens be urged, *increased*, or *restrained*, or *safely stopped* at will; and are the principles of incubation fully understood, and can nature's whole operations in the delicate processes of incubation be plainly pointed out, and all of nature's requirements as completely met by the application of science and educated common sense as by the ancient slow and uncertain system of setting hens? In short, is there anywhere an *authoritative publication asserting the principles of poultry culture covering these and other kindred questions?*

The absence of such a book and continued inquiry suggest the necessity for some such authoritative declaration of principles; and will, we trust, be an acceptable apology for offering this book.

In all we shall offer, or assert in this work we shall aim to be hon-

est, and our highest hope in being able to satisfy all of our sincerity is, in every thing we offer *to give the reason why*. Thus are the writer and reader on equal footing and all enabled to see the force, or folly of every idea. Thus shall we hope to bar that brainless charge of "offering only theory."

To those who dogmatically deal only in the delicious diet of their own experience there seems to be, somehow, an insufferable sensitiveness when scientific truth corrects some antiquated error. Especially to those who are innocent of all ideas, there is an inherent odium inseparably associated with the epithet of "Theory." Whenever an old physician relaxes his grip on professional principles and for twenty, or thirty years ruminates back and about over professional pastures that have been closely picked and beaten down and dry, he always inflates with self-sufficiency and wraps about in raiment of perfect experimental self-righteousness and from the throne of such immaculate wisdom he hurls the terrible taunt of "*theory*" at the clearer heads of all who love the light and seek the truth and offer to all some sensible reasons: so every body may clearly understand just what they intend to do.

What is theory? Why theory is the principle by which any operation is done. We build houses and cultivate commerce and calculate time and tides and do all the wonderous workings of the world through theory. Those, who, therefore, deride its dictates affirm, in effect, that they are blind and unguided. Theory sent Columbus in search of the New World. Theory opened the golden gates and revealed the mathematical grandeur in the deep and delicate problems of astronomical science. Theory unfolded to Fulton and Franklin the practical utility of steam and lightning and Theory has been the motive power in all the brains behind all the discoveries and inventions, all the arts and sciences and agencies that have advanced the world on and up to the full blaze of glory that illumines the nineteenth century. Theory is the strand of classified pearls of the immortal mind. Theory is the essence of intellect, the royal child of cultured thought. While we love intelligent experience as our mother we embrace intelligent theory as our wife. And so in our onward march through the theme before us, we shall aim to so associate the two and make our thought, our principles, our theory so plain, so practical, so self-evident that even "the wayfaring man," the overly captious may comprehend and be content, and so, without

further exordium, we enter, upon our subject.

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## CHAPTER II.

POULTRY CULTURE CONDUSIVE TO HAPPINESS AND HOME CONTENTMENT.

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HE love of animals and pets is inherent in the human race; and especially such as may be subservient both to pleasure and to profit; and thus it is, in a degree, that domestic poultry has become almost as universal as vegetation and indigenous in every door yard. The private importance of poultry culture can only be estimated in the absence of fresh eggs and spring chickens which must certainly ensue unless ones-self, or others prosecute this pleasant pursuit in excess of self supply. Indeed, were these denied the epicure, the rarest luxuries of modern life were lost and cook and kitchen soon would lose their potent power "to sooth the savage breast." Coffee and cake, confectionary, pastry and pies and pudding all cheerfully confess the delightful, and all-important, the omnipotent influence of fresh and finely flavored eggs. Nor is this influence exclusively confined to taste, but enters as brain food, as we shall note ere long upward into the divine domain of human intellect.

It is, therefore, impossible to over estimate the private importance of this delicious and most healthful diet; and, following the necessity of their supply we come to consider the almost incredulous public demand for poultry and poultry products; and so, we may in some measure determine the very high commercial status of this important industry in other countries and in our own.

In a series of thoroughly elegant, full and accurate articles in the *Fanciers Gazette* of 1883-4, Capt. Jas. E. White of Englewood, Ills., has contributed to poultry literature the statistics that cover this question so completely that, by his courtesy, I quote at length from a source so faultless and full:

"Belgium, with an area of 11,373 square miles and a population of

5,253,821 is one of the smallest and most densely populated powers on earth. About 60 per cent. of its area is under the most exhaustive cultivation and that being all of it that is capable of producing good crops. In order better to understand its extent it may be stated that Belgium is no larger than the state of Georgia while its population is three times larger, and this little country, as shown by its statistics, produces annually 274,967,824 eggs or 48 eggs for each man, woman and child in Belgium.

This, remember, is accomplished in a country where the most persistent effort is made to cause the land to produce the food necessary for home consumption and where a vast amount of money is expended on the cultivation of the soil. From such a necessitous system of farming they derive no profit from their crops and are driven to strictest economy and subsist only by aid of poultry culture.

If such results obtain under the adverse circumstances just cited what grand possibilities suggest themselves with infinitely better facilities in every sense in such an avocation in a land like America. Our soil yields the richest returns for the slightest labor and here grain enough is annually wasted to feed the entire population of Belgium and yet in the United States the products of poultry culture do not meet the home demand.

“Again France, with an area of 204,147 square miles of which only 98,460 are capable of cultivation, realizes more than \$200,000,000 annually from her poultry interests. The present population of France is 38,905,788 which, if an equal distribution of land were made, which is capable of cultivation, there would be two acres to each, and yet, with all the disadvantages of climate and the contracted acreage and high cost of food for fowls which here abounds almost spontaneous, France, notwithstanding, furnishes England annually over 800,000,000 eggs. In addition to this enormous exportation to England, the French people annually consume over 2,000,000,000 eggs, thus making a grand total of 2,800,000,000 eggs annually produced in our little sister republic. The value in cash of her importation to England annually is \$13,000,000, and those consumed at home is placed at \$35,000,000, and adding to these the poultry exported and consumed at home at \$75,000,000,000 and \$45,000,000, for stock carried over each year and it will be seen that the poultry industry of France represents an annual business of \$168,000,000.

The egg producing districts of France being Normandy, Picardy,

Artois, Soissonnais, Vexin and Britany, are cold and damp as compared with this country, vastly inferior in natural and climatic conditions. There space being contracted, their fowls are confined and highly fed and so subjected from crowding to sickness and contagion, and, yet despite all these and other disadvantages the French poultry farmer realizes a net profit of from 15 to 85 per cent., or an average of over 20 per cent. from the poultry industry.

It will thus be seen that poultry culture in France, under a thorough system, with climatic disadvantages, limited range and want of forage, the difficulties are conquered and commercial poultry culture made highly remunerative. But, passing from the difficulties, the drawbacks, the drudgery of poultry culture and its commerce in foreign countries where eggs, rather than by wholesale hatching by machinery, appears to be the main purpose of the poultry man, we come to consider from the same statistical source the extent of the poultry industry in America under its present development and its capabilities under more energetic and scientific management. Careful inquiry reveals the astounding fact that the United States instead of producing more eggs than is required for home consumption, imports annually over \$3,000,000 worth of eggs. We find that in 1872 we imported 6,000,000 dozens, which at 24 cents per dozen amounted to \$1,440,000. The announcement that the demand so much exceeded the supply for this article of food should have fertilized the growth of this industry until home production attained such magnitude as to make importation unprofitable. But it failed to attract the attention of the producing classes and so we find that, our population constantly increasing ten years later, or in 1882, the United States imported 13,000,000 dozen eggs which at 24 cents per dozen equaled \$3,120,000.

In 1868 a convention of butter, cheese and egg producers was held in Chicago and such reliable statistics as could be, were gathered without a systematic effort being made in that direction and were placed before the convention and limited though they were, they disclosed the fact that, the egg trade alone, amounted to \$180,000,000, and with the poultry marketed to \$250,000,000 per annum. The statistics presented were very incomplete being taken from a state here and there and in part made up from the knowledge of each in his own locality and so the sum fixed upon did not fully represent the value of the industry throughout the whole United States. Careful

research reveals the fact that New York State consumes and supplies to her merchants and those of other eastern cities and states and to vessels sailing from her ports about \$90,000,000 worth of this kind of food annually. Consider these figures a moment and you will begin to realize the magnitude of this industry. But New York does not produce what she sells or consumes. Enormous consignments come continually to her markets from foreign countries and from all over our land. Only a small portion of what she handles is produced within her borders. Not one-half received is consumed within the states, the larger portion being reshipped to surrounding cities and states, supplying vessels, places of pleasure resort, and the great hotels and eating houses of the cities within a radius of thirty or forty miles from New York City comprising a population of over fifteen million consumers of these supplies. New York state and city consumes about \$45,000,000 worth of eggs and poultry annually and her regular population of both state and city being about 5,082,871 the average consumed by each individual in the state of New York is about \$9.00 of poultry food annually and when we consider the interminable train of strangers that pour perpetually through her cities the wonder is that these figures are not magnified many fold in as much as eggs enter into nearly all our food and spring chickens may be found on every bill of fare. The fact is that this food cannot be furnished in sufficient quantities to meet the demand in all great cities and it is reasonable, therefore, to assume that the consumption of poultry food by each individual throughout the nation is as great as in densely populated cities, and a moment's reflection and common sense will justify the conclusion. In whole sections of country where agriculture forms the main pursuit, remote from cities and markets, where every body earns their living by manual labor which requires much more animal food than supplies the same numbers addicted to sedentary life and raising such food upon their farms the amount consumed is vastly greater than in cities. In summer, when such food is mostly needed and unable long to keep the carcass of cow, or calf, or hog until consumed or unable to sell, they draw their meat supplies very largely from the feathered flocks as needed and thus enormous numbers of eggs and fowls find their way to the table of the farmers and feed "the countless millions of the sons of toil." Again, we may further strengthen the assumption that these supplies are in greater demand out side of the great cities by the fact that, in

every village and inland town in America poultry and eggs are the universal medium of exchange between the farmer and family groceryman ; so that really, the inhabitants of these smaller incorporations subsist much more extensively upon poultry and eggs than the larger and more populous cities where they are less plenty. *The foregoing being self-evident facts*, it is therefore, modest and more than safe to draw our data from the commerce existing in New York as a basis for calculation with respect to the country at large.

Therefore, if New York state and city with her 5,082,871 steady population, independent of her transient population consumes \$45,000,000 worth of poultry and eggs annually, the United States, with her 55,000,000 population must consume \$495,000,000 worth, and in order to determine the value of the entire poultry industry of the country we must add to this \$64,000,000 at to the value of fowls retained for breeding and laying stock and \$600,000 the value of blooded fowls and eggs and thus it reveals the sum total for this industry in America of \$559,600,000 annually, or as the full statistics would more than show, \$600,000,000. ”

Thus, we have liberally drawn from the articles and arguments the facts and figures of Capt. White, because the statistics are astounding and yet unquestionably true, and because the research is most thorough and the whole subject handled with that earnestness and elegance, power and precision that merits a prominent place in poultry literature. The same able writer has also affirmed that, “The poultry industry in the United States surpasses by several million dollars the annual value of wheat. ”

Consulting statistics from other sources to verify the accuracy of these statements we find his figures invariably correct. From the circular of Mr. J. L. Campbell, of West Elizabeth, Penn., author and manufacturer of the Eureka Incubator advertised in this work, and commended as one of the best of machines, the author draws from the United States statistical bureau the following which is official. For the year 1882 the following figures reveal the cash value of the products of the United States. Cotton, \$410,000,000 ; hay \$436,000,000 ; dairy products \$254,000,000 ; wheat \$488,000,000 ; *poultry and egg products*, \$560,000,000. Notwithstanding this, the later is the only product we do not export. Our entire yield, which is vastly insufficient, to meet the demands, is all consumed at home and besides, in 1882, statistics show we imported from foreign countries

13,000,000 dozen eggs as against 6,000,000 dozen in 1872." Still the clamor increases, the prices advance and the importation of these supplies from foreign countries more than double with each decade, such is the present business status of poultry culture in this country. Statistics are the driest of intellectual diet, and yet beyond all things else on earth figures are fullest of truth. Mathematics reveal the actual reality of things.

They have shown us that the net profits of commercial poultry culture in foreign countries under the greatest disadvantages, are from 20 to 85 per cent. They have proved that of all the products of America eggs are mostly in demand, greater by far, beyond anything else than the supply. And they have shown, in consequence, our annual importation of eggs to reach a cash cost to this country over \$3,000,000. This vast sum goes out of this country to foreign countries annually for eggs. Why don't we further cultivate this pleasant and profitable industry at home? We have seen that the state of New York consumes \$45,000,000 worth of these products annually and this divided by her 5,000,000 population, equals \$9.00 of poultry and eggs consumed each year in the state of New York by each inhabitant, and so it may be seen by multiplying our national population of 55,000,000 inhabitants by \$9.00, the amount consumed by each, that we have \$495,000,000 as the sum total for poultry and eggs consumed each year in this country.

Then add \$64,600.00 for stock and blooded fowls, and we reach the enormous sum of 559,000,000., or, if full statistics could be given to date the sum total would doubtless surpass \$600,000,000.

Efforts are now being taken to make the statistics of American products reliably complete.

Statistics have shown that in comparison wheat, the greatest agricultural product in this country, is surpassed by poultry and eggs over \$72,000,000., which amount of money is over four and a half times as much as President Jefferson paid France for the Western half of this continent. And this \$72,000,000., remember, is in excess of the total cash value of the whole wheat crop in this, the greatest wheat growing country on the Globe. Hogs and hay and corn and cattle and cotton, wheat, oats and other American products are each and all cultivated extensively in certain sections, but altogether unknown in others, but poultry, like the blessed sunshine that imparts its favors and force to castle and cottage, brings its benedictions

every where, wherever humanity hath found a home, and this universality of poultry culture, explains its strength and importance and proves that its *private importance* and *commercial magnitude* is almost fabulous and opens to capital and business competency the grandest and most fruitful possibilities. And yet, this giant young industry is but in its infancy. The world is just awakening to this traffic from the long dream of ages.

Until within the past few decades the idea of *poultry culture* as an industry, poultry culture, *as a commerce* was unthought of, unknown and ignored and, yet, a prejudice prevailed that bars the greatest results, that weakens the confidence of capital to its claims. The poultry culture of the past as compared with the present contains a general complexion of degradation that is almost comical. Indeed an honest cartoon or charicature of the poultry of a few years past would be equally ludicrous and difficult to draw. Until within the past 35 years the raising of poultry was never attempted by men. The wives of a few farmers, more intelligent and enterprising than the rest, were allowed to tolerate a few fowls that were a mongrel mixture of all the endless varieties that had cohabited together, crossed up incestuously, ran riot and reveled in romance since the exit from Noah's Ark. These fowls, as I well remember them, combined every conceivable shape and color and all were covered by the truly suggestive name of "*Dunghill Fowl.*" The name is not of classic origin, but rather relates to the source whence they scratched out a scanty sustenance. They were taught by the *terrors* that were thick about, and by the suggestions of stern necessity to enter the realms of morpheus or retire to roost in the language of the time, on the fence, or in the trees and to forage in the fields and gardens and on grain stacks and in corn cribs and otherwise steal what they could from all other well fed stock. They annually hatched their chicks from the eggs they succeeded in hiding in the weeds and hedges, among briars and underbrush, behind old logs and stumps, in fence corners filled with smartweeds and fennel. Their eggs were hunted by crows by day, and by coons and other enemies by night, and thus these wild and wayward hens had a rough, romantic and cheerless chance. Often against all odds, however, two or three came creeping and clucking out of copse and chaos with one little sorrowful, sickly chick, and they were allowed to care for and comfort it, since their *time* was computed of little consequence. Again,

some old blue biddy, with educated cunning above her kind, would overcome all opposition, and, sheltered thus from the rapacity of all around her, this long lost and finally forgotten, this ancient, earnest, dunghill hen would at last come out from her covert with a chick for every egg she hazarded with her life on the alter of devotion to maternal duty. The later summer and autumnal months, devoted thus to "nest hiding" and natural hatching, was the only serene, untarnished taste of pure repose and perfect peace that over filled and satisfied the soul of these guileless, goodly dunghill hens.

Now where on earth, in nature's vast domain, nor in colleges or vast cathedrals can there be learned such lessons of care and caution, of energetic honesty, of patient, persistent fortitude and faith as there, cloistered and self-concealed alike from friends and foe, was silently wrought out in the life and labors of this spontaneous, self-supporting barnyard poultry of the past. Though, like the christian cultured and truly good young Indian, or the haughty, highborn, romantic and *really noble red man* of whom we read, they have been gathered in by life's relentless reaper and are gone, and covered up by the polished plowshare of civilized progress, still, for all the solace my youthful innocence found in their society and service, I owe to their memory this recognition, this tender tribute, this sad but fond farewell. But, to return to their history. These flocks were mated promiscuously and by their own impulse and prowess. Often thirty or forty males meandering up and down and fighting over half as many females all indulging in a wholesale system of loose incestuous revelry and riot. Such of this ancient stock as survived the wild winds of winter, its piercing cold, and ice and sleet and were not starved nor frozen on the roost, emerged in the spring with scaley legs and frozen combe and feet, with feathers full of vermin, and all so out of order that seldom they succeeded in dusting out the lice and gathering from grass and garbage nutrition enough to bring the abused system back again to vernal action, to honest vital business, by the first of April or May. These ancient farm fowls were much the same in every section and state all over the continent. They crowed and cackled and looked alike, they wore the same general complexion and were characterized by the same essential cussedness everywhere between Maine and Mexico and from Oregon to Atlantic Ocean.

One general slush, of nature's brush,  
Had made them all akin.

Their average weight at eighteen months old was three to five

pounds. The hens often hid their nests in the haymow or on top of stacks, would fight anything and often pursue a hawk high on the wing for hundreds of yards trying to retrieve a stolen chicken. They seldom carried surplus fat, they sought few favors but took care of themselves from choice, from habit, from instinct and from necessity. They combined all conceivable colors from the beautiful and brilliant long sickled cock to the wretched and revolting frizzly fowl so odious that it offends the Lord and the laws of nature. And then we had the "bunty," or rumpless rooster, "the creepy," or duck legged fowl, and best of all, the sturdy old Dominique and many more all merged, and mixed, and married at will, into the great plebeian family of mongrel barnyard poultry. These birds were thus bred for ages, forward and backward, incestuously and so long, that each specimen stood for self and the whole vast society whence it sprung; it represented everything in general and no distinct type, or strain, especially, except when scrutinized or even at the first inquiring glance the specimen could always be recognized as an undisputed dunghill bird. Thus, everywhere as we have suggested chickens were tolerated or allowed to live, but never *carefully cultivated*; and, if they yielded little, as compared with latter years their *cost and care were nothing*, and so altogether, the net profit of the old barnyard system could never be less than one hundred per cent. But birds thus bred were seldom fit food. for, only when fed from nature's lap were they either fat or fertile. Intimately associated, with such a system of poultry culture as I have sketched, my youthful ardor knew no bounds; my thoughts were always with the chickens. This partiality for poultry culture has completely possessed me from earliest recollection, and grew and systematized with later developments, and yet remains a pleasure that is past understanding.

The personal cares of poultry culture, supreme over everything else is the one kind of labor I really enjoy.

Thus matters moved on until about 1855 when an enterprising man from Massachusetts emigrated to the far distant west and settled in Illinois within three miles of me. He brought among us the most marvelous creatures that the wild and tragic freak of poetic dreams could picture, They were the most splendid specimens of the great invincible and voracious shanghaie.

I walked three miles to see those "giant celestials." At once they inflamed a furor all over the West that was only equalled in the

Eastern States whence they came, and where the so-called "hen fever" had been raging for several years with all the force and dignity of an epidemic, until finally, as I have indicated, it spread westward until the unsophisticated citizens of Illinois felt the infectious fever for the great fancy fowls." I scarcely need to say we all fell down and worshiped this ancient bird of paradise, all offered any price for eggs and soon high grade birds abounded everywhere; were sent to distant relatives and friends and so the impetus and improvement in poultry culture began and spread in Illinois and somewhat similarly all over the states. The color of this early imported stalwart stock was *buff* and differed from the stately strong and sturdy *buff cochin* of today only in legs and breast and body. In other words, the modern buff cochin is a lineal descendant from the far famed shanghaie; cut down from his original altitude, spread out and yet condensed in every direction, grandly gilded and perfected in plumage and, in short, bred up by a standard uniform rule to more consistent, symmetrical and useful shape. Later the *Brahma* breeds were introduced, and soon these Asiatic, thorough-bred birds diffused their blood all over the American Continent. Their influence for good was soon felt in almost every flock of fowls; and so there was awakened everywhere an extravagant excitement over the newborn business of poultry culture. The attempt by many, at first, to breed these fowls as they came to us and so perpetuate them pure met with the most universal and discouraging failure; solely from inacquaintance everywhere with the first essential conditions of success in poultry culture. Naturally enough, the glowing high heat of the so-called "hen fever" cooled quickly down, to be replaced by a *prejudice* that ruined at once the splendid commerce so recently started in "fancy fowls." The fever seemed fatal until the cause collapsed. Thus, for a time the first attempt at what we now call "standard poultry culture" met with unmerited and ruthless rebuke; and yet, to this day the true inwardness of this interesting episode in the history of American Poultry culture is wrongly referred.

I dissent from the diagnosis that the public high appreciation of these fine imported fowls was in any just and proper sense a fever, or a diseased condition, or fanaticism. The very high prices paid for the finest specimens then and ever after quoted in evidence of the wholesale public craze to sustain the charge that, some designing Yankee sage had secured "a corner" on this new commerce and

then perpetrated a heartless humbug upon the credulous public and that such had killed the commerce, is absurd ; the prices then paid, I say, were nothing to be compared to what hundreds of fancy fowl breeders would freely pay today for the very finest specimens after the revival of this splendid industry. Nor is the disposition at fraud and speculation and courting the royal favor and so aspiring to secure the coveted corner in this commerce less today than then. But this, and only this distinguishes the early decline and the auspicious opening of that industry from its strong and sturdy status of today.

The people are *educated now* and *know the needs and actual necessities of such stock*. Then a *Poultry Journal* was unknown, or, at least, poorly appreciated and paid, and from one end of the land to the other the great slumbering industry of poultry culture was utterly *devoid of information and of literature*.

Naturally, then, a people thus conditioned, whose prejudices were wrong, whose poultry reading had not begun, and whose care for this class of stock was such as I have sketched, who knew and cared nothing for the comforts and diet of domestic poultry, but confidently expected *all feathered fowls to breed spontaneously and be self-sustaining* naturally, I suggest, that the sudden introduction of thorough-bred poultry among such people must end at once in misfortune, in the death of the stock, from abuse and neglect, in general discouragement and in early collapse of the commerce. Such indeed, is the universal history of revolutions in everything. The cause that occasioned the awakening can never be sustained until the people are educated en masse up to the required condition. Precipitate action, as in that case, before the people knew the needs and necessity of the situation, endangers defeat and injury to the cause.

The difficulty in the early decline of the "Hen fever" implied no fault, no fraud, but rather relates to *poultry periodicals and their careful study*. There is absolutely no cause or commerce that can long live in ignorance. *Special and general education* must underlie everything that survives, and poultry culture is no exception to the operation of that axiom. Such, we believe, explains the quick collapse of the early commerce in pure bred poultry. So much relates to the past and seems to us essentially necessary in this connection in order that we may soon consider whether the poultry commerce of the future is secure in its claims of greater permanency. Reverting to those years of general agitation from 1855 to 1860, dur-

ing which this earliest commerce "rose and reigned and fell" the irrepressible conflict of almost a century ripened into the great revolt of 1860 and civil war for 5 live long years absorbed the nation's time and talent, care and capital, and so delayed the reconstruction of this cause and commerce. Meantime, the thorough-bred was laying the firm foundation for an industry more substantial. New blood had been infused and bigger and better fowls had followed and soon the people every where began to see the priceless worth of what they had thought a fancy fraud and costly luxury. Encouraged again from better founded, healthier, and more deliberate public appreciation the patient, persevering men who knew the public need, with pen and poultry press, and organized effort cautiously kindled again the smoldering sparks of pure bred poultry culture. Then the larger, beautiful and better birds that abounded from these larger breeds suggested a purpose and source of greater profit to the market poultrymen and so demonstrated the right relation between the breeding of standard and commercial poultry.

The ingrafting, thus, upon the ancient seedling stock, enlarged and invigorated the issue into a vastly more lavish and delicious yield. Thus, the market poultryman perceived the possibilities of his business opening up her avenues of trade to almost incalculable extent.

## CHAPTER III.

THE NEW INDUSTRY ASSUMES TWO FORMS, THAT OF MARKET AND OF STANDARD POULTRY CULTURE, EACH DEPENDENT ON THE OTHER.

THE INFLUENCE OF THE STANDARD, THE EXHIBITIONS,  
THE AMERICAN POULTRY ASSOCIATION. THE INFLU-  
ENCES OF THESE ALLIANCES. THE OMNIPO-  
TENT POWER OF POULTRY JOURNALS. THE  
PRESENT STATUS OF POULTRY CULTURE.

**C**LOSELY identified with this industry and, indeed, its author and essential support, the breeding of thoroughbred fowls, found solid footing and universal favor. Thus identified in healthful relation the two young industries gathered separate from and continual force and, moving forward in their respective and reciprocal spheres, have grown as we have seen into a commerce that is almost incalculable. Thus we have traced the origin of the first attempt at improvements and organization of this industry to the importation of "fancy fowls;" and their influence upon the native mongrel scrub stock scattered all over the continent. We have indicated the growth and steady development of continually better birds, and, finally the renewed awakening after the war, to organized efforts under the impetus and auspices of the standard and poultry journals. However clear and conclusive the fact that the real value of domestic poultry had more than doubled since the first importations, yet, the public, generally, nor to any considerable extent had felt the marvelous effect of *poultry literature* and illustrations until about the year 1865, when, the poultry journals began to find their way to the homes of thousands through the mails to all sections of the country, imparting the most careful instruction in all the principles and details of poultry culture that ages of *blind experience* could never suggest. Thus, a second enthusiasm pervaded the

country, but thus renewed, *it come to stay*, because, strengthened and sustained by education and literary culture and acquaintance with the fundamental conditions of success. Conventions were called, poultry societies organized, a National Organization finally effected and for the purpose of concert and consistency in pure blood poultry culture in the upward and right direction towards ideality of form and feature. The general judgment of all was evoked and what we now recognize and reverence as "*the Standard of Excellence*" was begotten of the largest experience and best brain of that studious strong and earnest organization.

The first National Organization met in 1872, and the necessity of a standard canvassed and finally consummated since which time, though subjected to criticism and correction and official revision, it went into operation everywhere as the will and ablest idea of the high consultation of America's best breeders. Thus, under this constitution, or organic law of the land with respect to poultry culture may be dated *the dawn of Scientific Poultry Culture in America*. It became at once and still continues *the one supreme idea wherein all efforts at improvement centers* as the ideal pattern by which to perfect *the useful form and fancy finish* of the Fowl obedient to wise and worthy dictum. The American Standard of Excellence thus formed is a strictly representative instrument and, in the very best and broadest sense, a purely democratic decree. Its influence for good at once vindicated the wisdom that announced the necessity of something that thus should organize and operate the nation's forces to one common end, so that all might comprehend and execute a common plan. What to most minds was before chaotic, in correct conception, uncertain in matters of symmetrical outline, and altogether mixed and muddled in all the delicate details of form and finish, of each and every variety, the standard now made clear and well defined. It arbitrated all questions, it settled all disputes and afforded everywhere the same sublime design and definition of a perfect pattern. Hence, what before was clash and conflict, was settled by the standard's high decree into a universal unity of thought and effort and end. Like the constitution of a country, which, by common consent, becomes the supreme law of the land under which all other laws that regulate and control the mightiest and minutest private and public affairs are framed, so the standard in poultry culture *vitalized and legalizes and underlies everything*. And so, when I con-

template the wonderful work of the past thirty years of poultry culture, and ask, and seek to answer the inquiry and satisfy my conscience as to what hath wrought the great and grand result, the truth irresistible suggests *the standard* as the central power of one stupendous whole. Without the standard to interpret and teach, poultry culture was chaotic and in universal conflict without light or law, without foundation or faith, without concert of purpose or principle or plan, all operating adversely at every angle instead of moving under its operation and governed by this guidance up the avenue of the future on peaceful parallel plains and so demonstrating that a standard rule of action can alone secure that unity of plan and purpose essential to the prosperity and perpetuity of any society, cause, or commerce.

Under the old articles of confederation the American government operated aimless in every direction with state and federal functions, limits and liabilities, but dimly defined, each alternately acting outside its proper orbit and the whole federal fabric that has guaranteed our marvelous growth and greatness was found by experience to be so defective before the adoption of the Constitution. or great national standard law, that our whole political system, as it then existed, has since been aptly characterized as "A mass of stubborn societies held together by a rope of sand."

Second only to the standard and as *interpreter to it are poultry illustrations*. There is scarcely any other power so potent to force the public education forward and upward to a high appreciation of poultry culture as chaste and elegant and life-like illustrations of our finest standard fowls. There is no eloquence like silent, earnest eloquence; objective, life-like, splendid pictures. The lesson learned, the impression produced by the master painter's scene of the Last Supper deepens the credulity of the most dormant faith in the sacred stories of antiquity. The picture brings them right before you, bright and fresh, and at once awakens the liveliest interest in what the picture represents; and thus, as educators delineating different parts and special sections and special feathers, these correct and effective drawings awaken a universal love and longing for such specimens, and so they attract the attention, they strongly appeal to our taste and finer feelings and soon persuade us to begin at once to buy and breed until we attain to the end delineated in the illustrations. Such is the power of illustrations, of correct

cuts, for fancy fowls when sustained by the precepts of a good poultry Journal. This combined influence gave birth to the Poultry Exhibitions and here the emulation and rivalry inspires all to excel and the *spirit of infection spreads* until everywhere. the *growing influence of all these grand factors* of this great industry is felt, and a new focus of influential force radiates out from every exhibition.

Such, then, are the *educational alliances* that have acquainted the American people from ocean to ocean with all the essentials and details, the pleasures and profits of standard and commercial poultry culture.

Incidentally, the foregoing considerations have suggested the *present status of poultry culture in the United States since the revival of this industry, and especially during the past ten years the constantly operating influences*, to which we have adverted, awakened special interest in this pursuit, and, not content with the size and symmetry alone, other aims have been successfully wrought out by which the *poultry of the present are infinitely superior*, both in beauty and actual utility, to any ever known before in the history of the world.

Among the especial excellencies to which we have but recently attained in poultry culture may be mentioned prolificness in eggs. This special function which lay dormant during cold, inclement seasons, among the poultry of the past, is *operative among the better breeds at present, almost all the year*. Prominent among the influences effecting this result was; first, *special selection* of the most prolific layers, these being carefully separated and subjected to superior care, contributed still further to effect this desired purpose, and so *special strains* were established that were noted especially for *egg production*. Then, to widen these families and so avert the debility of inbreeding, *new varieties were composed* combining the elements of size and egg fertility. Thus, the Asiatic male and the medium hen produced a progeny which was stamped by a top cross that should make the new variety medium, large or small, as desired.

The purpose of the Plymouth Rock was to produce a specimen medium in size between the large and awkward asiatic and the smaller breeds, and yet preserve the egg fertility of both. To this end the Light Brahma male and the black Java hen were mated and their progeny subjected to the American Dominique cock, which stamped the characteristic color of the Plymouth Rock and, by care-

ful selection of the better barred and more beautiful of these and breeding to that end, the beautiful blue barred bird, large in size and elegant in everything, has been builded up and immortalized by american skill and enterprise.

Again, the Silver Spangled Hamburg and the Dark Brahma were mated and from this cross came the new and prolific and popular breed of poultry admitted into the standard family of fowls under the title of Wyandotte.

The success of these combinations encouraged still others in process of experiment and so the future outlook in this direction is fruitful and infinite. New methods of productiveness and new inventions for incubation and the application of scientific ingenuity for the comfort and care of the illimitable life that is constantly thus evoked and active energy formulating everywhere and embarking in the promising pursuit of poultry culture, and others, well established and still unable to fill the smallest per cent of their orders, with population constantly increasing and the demand beyond our production of eggs over 16,000,000 dozen in 1884, and still the demand for poultry and eggs increasing and high prices prevailing everywhere, for these products, exhibits but partially the present status of poultry culture in the United States. Never, perhaps, in all the past was an industry so full of merit and yet so neglected and under estimated. Under the present impetus and universal awakening encouraged by literature and scientific invention its future is full of the richest returns for capital and labor required in its commerce. But like every other avocation poultry culture is a separate and distinct and earnest avocation. Its cause and commerce admit no idlers nor business drones. It must have brains and capital to control it like everything else.

[ Poultry culture can be made remunerative by those who love it and labor and study patiently and persistently.

In short, it demands practical business education, steady, industrious habits, some capital and more common sense. Thus qualified poultry culture is the most pleasant and profitable of all pursuits. *Poultry literature* is the life of this labor. The poultry journals pour perpetually a flood of light into the deep darkness of our dormant understanding giving us the essence of everybody else's experience.

The best prescription, then, to induce that love and enthusiasm so

essential to success, *is poultry journals well read and duly digested.* Lest this should seem dogmatical, arbitrary, and peculiar alone to this pursuit, it may be suggested that such is true in every avocation.

All, to succeed must study the teachings of others in their special field of labor.

Thus, the drudgeries and difficulties that would otherwise discourage are the more easily overcome from the love that abounds in the business.

The actual or approximate profits to be derived from the business is difficult to predetermine. So much depends on proper management, on business capacity and capital. The issues are subject to the same axioms that operate everywhere. Talent, industry and economy in this as well as elsewhere, with patience and persistence will lead to wealth. It would therefore be unsafe to suggest anything further than the possibilities that open up through this giant young industry. Death and taxation are said to be all that are certain on earth. Accidents are known to be operative everywhere but not so liable in poultry culture as in other avocations; because we are contracted in our operations, are under the auspices of science and can therefore better control those conditions essential to success than if left to the mercy of the elements that are irresistible and so often destroy all business calculations.

May we venture to further offer some suggestions in behalf of the claims of poultry culture as a profession that seem to us especially pertinent? There is scarcely a prominent industry in all this country that is not suffering from overfullness. Large merchantile establishments, banks, railroads, corporations and farmers all feel the irony of fate, or adverse fortune. There is sluggish circulation through business channels, there is, indeed, congestion, distress and, more or less, complete collapse in many points and places. Why? Because these several avocations are overdone. The Millers' Organization and the rigorous winters and the long, continued cultivation of the one cereal upon the same soil assures the farmer of several things, namely, that his crops are overcrowded, his land is over operated and the great milling monopolies are organized against him. Well, what shall we do? Why, poultry culture is in its infancy: its fields are rich and capable of making yours still richer. Its resources are almost incredible. It calls for recruits. It can't furnish the food that millions would purchase of you at any fair price.

Here then, is your opportunity to rest your land and bring back the organized monopolies to respect your rights. Poultry culture thus assists in drawing off the overcrowding of all other industries. It is, indeed, to-day not only the most prominent and prosperous of all the industries, but the greatest of all; because, as we have seen, it depletes, draws off the overcrowding of all and so becomes an equalizer of the nation's industrial forces."

The immense and *constantly increasing* demand can never be supplied. One hundred and fifty million meals cooked and consumed every twenty-four hours in the United States will always insure the highest price for fresh eggs and broilers and so successfully bar all over production. Poultry culture, therefore, as compared with all other avocations, has certainly these very strong points in its favor.

In furtherance then of what we have suggested we come in order to consider the practical operation of this new industry.

## CHAPTER IV.

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THE INHERITED NEED OF THIS INDUSTRY AS A SOURCE OF NATIONAL FOOD SUPPLY. THE ABSOLUTE NECESSITY OF THE INCUBATOR, COMPARED WITH OTHER IMPROVEMENTS. THE INSTINCT OF THE HEN AND HER PROCESS OF INCUBATION. THE DISQUALIFICATION FOR ENLARGED POULTRY CULTURE. THE TWO SYSTEMS OF POULTRY CULTURE COMPARED. THE AUTHORS EXPERIENCE.

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WE have hastily sketched the agencies most actively operative in its development ; the influence of the asiatic and other pure bred birds upon the native stock ; the unifying force of the standard ; the public exhibitions and the poultry press have combined to create a public appreciation and education that has placed the poultry industry ahead of any other single productive industry.

The literature of scientific poultry culture has taken its place full well advanced and moving with all things else abreast and along the line of modern thought. Science, too, and invention have allied themselves with literature to do her service and thus sustained, is poultry culture, in all her forms and phases, at once most eminently respectable, practical and profitable.

Deeply impressed with its importance I commend to public consideration commercial poultry culture, by which, I mean production of poultry and eggs for market. The inherent need of this industry is indicated by the demand for poultry products. A constantly increasing population forces the food problem to the front. How shall we supply the fast increasing millions with good marketable poultry and eggs? The proudest plume in the coronet of any life is an actual contribution to the public good. He who feeds and clothes the hungry, the destitute and distressed, or who cheapens their food, or otherwise assists them to shut out the inclemencies and cold from

the cabin and wreathes the face of the family with the smiles of contentment, and paints upon the cheeks of the children the roses of ruddy happiness and health, in short, whoever contributes to feed humanity is the world's best benefactor.

Standard, or *fancy fowl culture* is really the author of this industry and, full of fascination, of worth and pleasure and profit, but let us remember that it rests on no really firm and enduring foundation, except we respect the one great practical purpose of actual utility in the end. Thus only, can we find a separate and proper place for the two great and growing industries, each separate and supreme in its sphere, and yet essential to the success of the other. Thus deeply impressed a number of years ago I decided to experiment with scientific poultry culture, to determine if indeed, there opened up in this direction an avenue to an honest, independent commercial enterprise. I found as my incentive to this investigation that financial distress was felt in societies all over the country. Everywhere I observed intelligence and education and virtue and moral merit embodied in young gentlemen and ladies, yet commanding a salary scarcely sufficient to meet life's necessities. I found, also, in the professions room for industry and honest capacity only on top and so I felt inspired with the hope that poultry culture might promise auspiciously for those who love such labor. I felt that much surplus talent might be taken from profitless pursuits and usefully diverted in the direction of absolute demand. In the fullness of time, in the midst of necessity, out of the soul of science and common sense the Incubator was born and introduced to supercede the slow and uncertain function of the setting hen. Like the advent of steam enginery when swift locomotion became a necessity, for carrying commerce and scattering the millions of humanity all over the earth; like the introduction of *coal*, when the supplies of wood for fuel were wasting away before the plowshare of progress; like reaper and mower, the thresher and sewing machine; the printing press and mechanical contrivances of every kind which came at the call of necessity and then came to stay, so the Incubator appeared in its proper time bearing the same high credentials. It, too, came to the relief of a system that has proved utterly insufficient to meet a great and growing public emergency.

The old system of poultry culture, after ages of effort, was found too slow and uncertain and otherwise too defective to found upon it

a large and lucrative industry. Statistics have shown that the same ancient system was utterly inadequate to meet the demand. Supplies are called for but the setting hens cannot "honor the draft" and so at once, machinery is suggested, and thus, the Incubator became a necessity.

The same was true of every industry. When the farmer confined his operations to a few acres, the reap hook and the cradle and the old fashioned flail were all-sufficient; but when agriculture enlarged her area and the farmers were called upon to feed standing armies and non-producing millions of men, when his operations augmented to the dignity of a great commerce and he found it necessary to garner his grain from thousands of acres, then, the farmer could no longer rely on the ancient slow and uncertain system of labor. A crisis had come and the operations of the past must be replaced by a system that was operated like martial movements by *one supreme will*.

Thus alone can any great industry be systematized and operated to any successful end. Thus, up through the ordeal of *practical experience* and from *inherent necessity hath labor saving*, reliable machinery been summoned to supercede the clashing, discordant workings of conflicting wills and so enable the farmer, the mechanic, the contractor and the poultry man, to put aside all that oppose them and push their respective operations under the auspices of scientific service, under perfect organization, all working out the quiet counsels of one intelligent will. Thus, the two systems of poultry culture confront me at this point and claim respectful consideration. Hereafter, I shall call the machine's operations the "scientific system," because the operation with hens, in *congregated numbers is equally artificial*, when worked on a scale of sufficient magnitude to entitle it to the dignity of a commercial enterprise as I shall soon proceed to prove. The poor hen, like the poor Indian in a state of nature, was virtuous and faithful and true to her trust until the demand of civilization the onward march of events and the realities of scientific research, trespassed upon her territory, invaded the sanctuary of her seclusion and tore loose the tendrils that entwined her affections to her native haunts.

Scientific poultry culture pleads responsible for the refined depravity of these once contented little creatures. For thirty years its emissaries have been tearing down, burning up the briars and under-

brush and old stumps and logs, trying to train and redeem the hen from her haunts in the highways and hedges and stifle her instinct at *nest hiding where alone is incubation natural*.

Poultry culture has thus devoted its energies and influence for years in trying to conciliate these poor creatures and train them to forget and depart from the impressions they derived from the Deity and to quietly conform to the civilized notions of scientific setting. The result is a failure and the invention of the incubator an actual necessity. I repeat that a good old setting hen, in a state of nature by which I mean when she selects her own seclusion, when she perfects all her purposes untrameled by any intrusion, when she lays and has left in her nest and hovers over and hatches her own eggs, in every stage, in this whole natural process, she inspires my highest respect and confidence in her capacity. Then we cheerfully concede her superior sense, her unrivalled reliability, her God given inspiration. Then and then only, are her operations natural, her processes perfect. Then alone, she evinces that infinite tact, that philosophic patience, that delicate tenderness and, withal, that high exemplary sweetness that suggests to the student of her character that she is swayed by some superior source, some supernatural sense. For the long and arduous ordeal of incubation she equips herself in finest physical condition. A hen is never fatter than when she begins her incubation. The two-fold purpose in this relates to herself and her capacity to impart the requisite high heat for the first few days to her incubating eggs. She thus enters upon the process and seldom leaves her eggs for several days until the vital germ is thoroughly imbued with throbbing, circulating life. Then her instinct teaches her the safety of going off for food. The natural temperature of a hen *declines* as the growth and circulation of the chicks within the eggs increase, first, because of her loss of vital force and flesh from loss of food and, more especially, from the absorption of moisture from her body by the hot, continuous currents of circulating blood in the brooding mass beneath her.

This process lowers the vital heat of the hen and elevates it in the incubating eggs all obedient to those laws of *osmosis* whereby the *higher and stronger circulation absorb to itself from what is less and close contiguous*.

At such a time as this the *more active movements of the hen, in lifting herself* and often moving alternately each egg to the surface,

suggests her consciousness that, now the chicks in the latter stage of incubation need more air. Either that *instinctive sense*, or else the *excessive heat derived from the chicks at this particular period* causes this frequent needed movement of the hen, and so, the constant cooling, fresh supply of air. But soon the incubating eggs approach maturity, and the mother feels the electric throbbing impulse of her tender off-spring, and then, again, for several days, she patiently preserves again her *continuous quiet attitude*. The little chicks are wet and need her highest heat to dry them and to assist the processes of nature to absorb the yolk of the egg which, for the first twenty-four hours, *is the all sufficient food of the chick*.

Thus from the beginning, or through incubation to the end, the maternal instinct of the setting hen, when thus conditioned, is divinely adapted to the chemical and vital necessities of the embryo within the egg and the tender offspring after incubation. *Such is natural incubation*. But when you *attempt to tamper* with her domestic duties, when you decide to restrain the wild romance and liberty she loves, when you attempt to *systematize her setting* and make her serve some *mercenary motive of your own*, you spoil her inspiration, you *reverse her revelation* and so *put out the light of her unerring instinct*. The result is she rebels, because she sees and feels that she can no longer obey her instincts and, that, therefore, everything about her is *unnatural and artificial*. She has lost the sacred, *dear delights of solitude and secrecy so sacred, to every mother during such an ordeal*, and the whole society and situation, thus imposed upon her, that she resolves to resent her outrage and wrong.

Our business is commercial poultry culture. We have arranged to breed young broilers for market. We find that the highest price prevails from November until May. Why? Because the hens will not set in winter. We secure our eggs and then solicit our hens to set; but her feelings are outraged, her instincts are dormant, especially at this universally barren and unfruitful season of approaching frost and snow, and so, under the setting hen system, we find ourselves barred from the very best prices when broilers would readily bring from 40 to 60 cents per pound, by the prejudice and perversity of the willful, wicked hen.

Now, this is no fancy sketch, but actual fact that cannot be overcome. But we decided to double our operations in the spring and for lack of room, we cannot, of course, afford each setting hen a sep-

arate house, and so, compelled by economy, we systematize and set some 25 or 50 or 100 hens in one large room. We have read about the "perfect process" and so we give to each a dozen eggs and confidently trust the whole enterprise to her integrity. We have confounded all distinctions and quite forgotten that separate hens, in a state of nature and hens, domesticated and crowded and confined in great numbers are altogether different. They, therefore, feel the artificial situation, they become perpetually more and more peevish and all the poetry and patience and unerring instinct that inheres in the ancient, honest incubating hen yields to what may be aptly called, the quintessence of all that is incorrigible, contrary and persistently cursed.

The commercial poultry man, the honest advocate of the old time system now feels the liveliest fear for all his eggs and enterprise and soon, in the forceful and emphatic speech of the greatest of living fanciers, he will proclaim "the most infernal luck with setting hens."

Friends, I seriously question the possibility of thus congregating 25 or 50 females of anykind in care of their young and yet preserve the peace. The whole atmosphere is soon full of electric envy and *contagious discontent*, and every effort to harmonize the harem imposes still another element of disturbance and awakens a worse discordant wickedness.

I think no saint or sinner can daily feed and water and care for 25 or 50 or 100 incubating hens without confronting this damaging discord; and, if unobserved an egg be broken, then all the rest, and all the nest, and the setting hen, must have a thorough cleansing, or, if perchance, a hen enjoys the luxury of lice, she strongly suspects her nearest neighbor happier than she, and so she quietly quits her habitat, starts out calling. She stays with each only long enough to scatter what she has to spare, and soon she induces others to imitate her discontent, until the domestic tranquility of the whole colony is torn up, the eggs broken, and abandoned, and everything endangered. But, aside from all these, we pass on to the period of hatching and when the first young chicken chirps, then every hen inclines to quit her eggs; and so from experience, and controlling everything with consummate care, I found it possible to handle a few incubating hens confined together; but the difficulty doubles with every accession to the crowd.

If you aim at anything less than hundreds and thousands of incubating hens your time and talent are involved and the corroding costs consumes your profits.

I am aware that many good people still prefer this ancient method of poultry culture and complain that I have grown too graphic in painting the perfidy, in touching up the moral turpitude and exposing the perverse propensities and innate cussedness of the old setting hen ; but, be it understood, that I am not arguing against a few setting hens, but the sullen and studied perversity that I have hastily sketched applies more especially when working with great numbers, and vast congregated numbers, of course, is contemplated in commercial poultry culture, which we are now considering.

The lice that must be looked after, the diseases that assail some, and the inclination of others to sit somewhere aside from the nest, the care and cost of; feeding and working and worrying and watching would wreck the hopes and health and happiness of any mortal. With 25 hens and 300 eggs the best result that I have ever had or known, under the most consummate care and skill, was less than 150 chicks, and then from five to ten per cent of these were crushed or killed by the hens.

Thus, under these several counts, we claim from the evidence adduced that we have honestly convicted old Bidly of cussedness, and general incompetency for wholesale incubation. We impeach her on the ground of cost and care, of deliberate mismanagement and murder.

We come, in order, to our other and only count wherein we arraign the setting hen system for conduct even less reliable and cruelty more complete. Here, again, we shall prove her utterly unequal to the high demands of *wholesale poultry culture*.

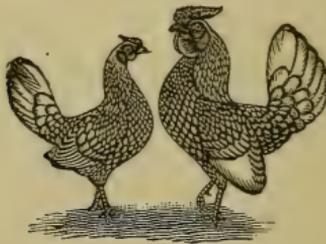
We have seen that congregated with, or contiguous to others she is especially nervous, quarrelsome and wickedly careless, and so incapable of operating largely together. We submit that it is impractical to *coop and so keep vast clutches of chicks confined*. If liberated, all are impelled by mutual impulse to fight. The discords never end until the chicks are killed and scattered. If allowed to roam at large, the weather must be warm, and then, this commerce poorly pays, besides, even then, the early dew and damp destroys one half the flock by conducing to every species of indigestion and disorder. Thus, unless confined, the chicks are drowned

by storms or die from cold and inclemencies. The quarrelsome hens require vast space to keep the peace; but, suppose we have conquered and overcome all and carried this load of cost and care of four or five or seven weeks. The chicks have grown to fledging and so have come to the period most critical with the chick. The hens selected for this vast enterprise must be the best of layers and hence, at such an age of her chicks, and very often earlier, every civilized hen inclines again to ovulate and lay, her chicks are yet half fledged, but are soon forgotten by this gracious natural mother, this guileless, goodly hen. With rosy comb and cheerful song she seeks again the charms of "the cock that crows at early morn." No longer does the distressful chriping of her shivering chicks awaken within her soft, maternal sympathy. Other aims and ends now animate her instinct and charms more chaste command her kindly care. Her suffering chicks seek everywhere the warmth and shelter she denies. They huddle in heaps hoping by mutual warmth to counteract "the cruel winds that visit them too roughly," but soon the sky is overcast, the storm pours forth its furies and the whole flock are drenched and drowned and die in every direction, unless caught and sheltered and cared for, independent of the recreant hen; and, so you summon that assistance in the end, that the scientific process has proved by far the safest from the beginning. But, still, another count we ought to press against this ancient natural process. The trouble and cost and loss and wholesale death described but poorly pays the penalty of the old hen's administration. The growing chickens thus deserted and exposed contract catarrh, and daily die of roup and irritative indigestion. Still others from these become affected until contagion kindles into a dreadful epidemic. Now, all this terrible train of direful difficulties must soon confront the poultryman *who embarks extensively* in this business under the auspices of the good old setting hen system.

I have drawn this picture from the actual, unfortunate experience of myself and others and have honestly aimed to indicate the utter unreliability of a large number of hens, either as incubators or breeders.

But, friends, what is the merciful avenue out of this dreadful dilemma? What is the surest relief from this wilderness of woe? Why, the labor saving machine, of course. The Incubator and the Brooder. The scientific process of poultry culture must come to your relief.

The Incubator is thus a blessing, born in the fullness of time. It represents one hundred hens, and is capable of hatching a thousand eggs at once, and it asks no greater care or cost while perfectly performing the function of incubating all these eggs than ten or fifteen hens. It never keeps you waiting for vernal spring to stimulate within its soul an instinct for incubation, It is always ready to receive all your eggs and leaves you free to consult the market and procure highest prices. It does the duty of the setting hen as perfectly as the reaper gleans your harvest fields, the electric cable carries your message under the ocean and around the earth on the wings of thought, or, if you please, it accomplishes with greatest precision and without confusion the work of innumerable costly, awkward operatives. It never breaks an egg nor infests the nest with lice. It hatches every egg that any hen could hatch. It never quarrels, nor kills your chicks, nor exposes them to storms or other ills. It keeps your chicks under you own control and allows you to systematize their feed. It narrows your chances of accident down to the single source of adversity and allows it then to assail you only under the name of neglect of the two systems of poultry culture, compared and fairly formulated, we have, upon the one side, *depraved animal instinct* and on other *educated human intelligence*.



## CHAPTER V.

INCUBATORS. USE OF ELECTRICITY. HOW IT OPERATES. THE ESSENTIALS OF A MACHINE. THE BAIN COMMON SENSE INCUBATOR. HOT AIR MACHINES. OBJECTIONS TO BOTH. HOT WATER MACHINES APPROVED. REASONS WHY. THE MANURE MACHINES. THE THREE ESSENTIALS OF ALL MACHINES ARE HEAT, AIR AND MOISTURE PERFECTLY APPLIED BY THERMOSTAT, THAT IS ABSOLUTELY SELF REGULATING. THE INFLUENCES THAT AFFECT THE SUCCESS OF AN INCUBATOR. AUTHOR'S EXPERIENCE. IMPORTANCE OF GOOD EGGS.



HE scientific system of poultry culture delegates no duties. It groups its great work, and disposes of all the petty details peculiar to the old process by placing every department under the auspices of exact science. For instance, every egg is operated upon alike, the temperature is uniformly maintained at any desired degree. Moisture is supplied by evaporation and pure, warm air circulates through all the machine. There are no broken eggs to befoul the rest and no crushing the chicks while hatching. Every essential to the perfect incubation and hatching of eggs are heat and moisture properly applied. The modern Incubators are many of them perfected to this end and under the unerring operation of electricity.

Well, how can this subtile servant of science subserve the purposes of poultry culture? First, and mainly, as a thermostat and messenger, by which I mean an instrument so adjusted within the egg chamber of an incubator that, obedient to the law of the *expansion of heat*, and *contraction from cold*, the instrument, thus delicately devised, under the influence of a certain definite degree of heat expands a metallic bar until it touches an electrode and thus closing the current of an electric battery, carries a current of electric force along the wire which operates and opens a valve and allows the outside cooler air to enter and so lower the temperature of the egg chamber.,

When thus cooled down to the desired degree, the bar contracts and so separates the bar from its connection with the electrode, the current is thus suspended and the open valve closes, the cooling process then suspends and the work of warmth again resumes. This electric contrivance operates like clockwork such perfect precision that it is impossible for the heat to run too high or the temperature too low, in other words the temperature is thus reliably and automatically maintained at any degree desired. But let us suppose your lamp goes out or furnishes insufficient heat then electric force is summoned to serve another end. A second battery similarly supplied, except, that instead of being adjusted to close the circuit by expansion of heat, this must be so adjusted that by contraction from cold the electrode is touched, the circuit is closed and the electric current sent along a wire which communicates with a bell in your office or residence near by, it may be, or elsewhere, *anywhere*, even many miles away. The ringing of this bell, then, is the distress call of the incubator suggesting higher temperature.

This condition could occur only from defective lamps or insufficient flame and sudden change to severe cold.

Again, another source of danger with many machines is where the outside temperature is not cool enough to lower the heat in the egg chamber with the valve wide open. The lamp, of course, should then be lowered, but this implies care and so much assistance that the incubator can scarcely claim its action automatic, or completely self-regulating. All this, however, has been remedied; first, by the electric bell which sounds the alarm alike for excessive heat or cold. Yet science was still unsatisfied and sought a more truly automatic plan and so recently perfected and patented a process termed the electric trip, by which the lamp flame is regulated, raised, or lowered as high or lower temperature is required. The machines thus operated are herein advertized and especially commended by reason of this additional and most highly practical and important consideration. An incubator thus equipped is equal to the eccentricities of all possible kinds and complexions of weather. If the weather turns severely cold the lamp flame is increased and when the temperature ascends to that degree at which the machine is adjusted then the flame is lowered: and so sensitive is the electric contrivance that operates the flame that the slightest change of temperature will move the lamp flame up or down, and, so the temperature over all

the eggs is perfectly preserved throughout the ordeal of incubation. Still, this is not wholly essential to success and many excellent machines are successfully operated and the temperature controlled entirely by the valve.

The principle difference between the leading incubators relates almost entirely to the best mode of regulating the temperature, applying the moisture, and supplying the air. These are, indeed, the essentials of incubation—the manner of turning the eggs and the mechanical finish of the machine being of less actual importance.

All manner of incubators have for several years been claiming superior excellence and inviting public patronage. The so-called "Common Sense Incubator" originated and advertised and imposed upon the credulous by Mr. Bain is, perhaps the worst of all. This machine consists of an air chamber over the eggs into which hot air enters from lamps and reflects the heat from the zinc above the eggs. The eggs rest upon some porous substance such as fine wire netting and the air tubes enter from below and approach the bottom of the egg tray. The purpose was ventilation, but as cold air does not *ascend*, nor hot air *descend* there is scarcely any ventilation; and as the pan of water is placed beneath the eggs where scarcely any heat ever reaches it, there is scarcely any evaporation and, as there is no valve or thermostatic arrangement connected with this mechanical fraud, the temperature cannot be reliably regulated and so it is, possibly, the most unsafe and injurious article of the kind on the market. I think that all hot air machines are objectionable on the point of unequal distribution of temperature and, again, the great rapidity with which they cool off. The air chamber must have an escape tube or chimney to the lamp. The lamp transmits its heat into the air chamber above the eggs by means of tin pipes and so *this chimney*, or tube allows the heat to all escape so soon as the lamps are out or lowered; and again, where the pipes enter the air chamber conveying the heat from the lamp, the chamber is unduly heated at that point. With a hot water machine, the *whole body of water is heated*; retains the heat long after all the fire is put out, distributes its heat over the whole surface just the same and so requires only the smallest amount of oil after the water is once warm and scarcely anything more in summer than a mere suggestion of heat. Heat has been more or less steadily maintained by filling a tank with hot water and, at stated intervals, *drawing off* and *adding* hot water

and so maintaining the temperature throughout incubation. But this process is only practical in connection with an establishment where hot water is always convenient. We tested this plan thoroughly after we had found out by experience the utter unreliability of the "common sense machine" and found the work of heating the water called for too much cost and care. In connection with a constant hot water supply it could be made a safe and sure method of incubation; but it could not be trusted to operate itself, the danger being in the direction of low temperature, as a thermostat could guard it from going too high. The heat must come from constant filling up with hot water and drawing off a certain amount of what has become lowered in temperature.

Again, stable manure has been utilized to afford heat for incubation, and as it is the slowest of all conductors it maintains its temperature longer than anything else, it will certainly supply the heat, if only rightly regulated. But here, too, the danger is in the direction of unreliable temperature and its want of self-regulating action. Other objections suggest themselves and, yet, I have no doubt, that an ingenious farmer could so construct an apparatus that with the vast amount of material always at hand, and with more or less watching and care, could hatch by this process successfully. The heat supply could be depended upon if reliably regulated.

But independent of any particular make of machine the question most pertinent to our purpose is, what must an incubator necessarily contain to meet completely the requirements of nature? First: It must furnish and distribute heat reliably and to this end it must possess a thermostat of some kind that will easily and automatically and absolutely control the heat supply. This is imperative. The machine, in order to supersede the setting hen, must furnish the requisite temperature more reliable than she and without the assistance of somebody else. The time for "setting up" with a machine is past and, besides, watchers are mortals and sometimes go to sleep. The machine, then, must be absolutely self-regulating in this regard, controlling its temperature with absolute and never-failing certainty. In order to do this, in my judgment, the regulator in order to control the heat must *necessarily control the heat supply*, otherwise, with more or less watching and care, we can only approximate the proper temperature all the time.

Automatic, even, and reliable temperature, then, is the first essential.

The 2nd essential, and, without which, artificial incubation cannot succeed, is the perfect automatic application of moisture. The inherent necessity of this 2nd essential will be considered and explained under the caption of incubation further on in this work.

And, 3rd, the incubator must afford the most thorough ventilation.

These three essentials constitute the "*sine qua non*" of every incubator, for without these there is nothing to be expected from any machine.

Of course, all the first class incubators are more or less perfect in these essential particulars; but, to guard the beginner against the impositions that are practiced upon thousands, the purpose of this work has been to place before the reader some reliable data by which he may determine intelligently, the merit of any machine.

After these considerations come those of less vital but often sufficient force to determine ones choice amongst which, are ease of action, durability, style of finish, capacity of air chamber, the manner of turning the eggs and the length of time the batteries last without attention.

Machines are operated successfully without electric batteries, among these the New Axford Incubator, of Chicago, Ill., enjoys a wide reputation. They were the first to publicly exhibit their Incubator in successful operation at the great fairs and poultry shows all over the continent and have made and merit a national reputation on their excellent machines.

Mr. James Rankin's machine, the Monarch, is also remarkable for its successful record, being regulated both in its temperature and its lamp flame by a thermostat, which is operated by the expansion of its heated water. The full description and mode of managing each machine is always furnished on application and so need not encumber these pages. It seems only necessary here to say: do not expect any machine to hatch every egg, or even all that are fertile.

Some time since we purchased a pen of five fowls that had been badly wintered and were suffering from scaly legs, but soon began to lay. I set their eggs and, though fertile, they failed to hatch—almost every chick died in the shell, or soon after. All seemed to suffer from utter debility and those that hatched soon after died and this, too under the ancient hen system. I applied mercurial ointment to their legs and soon destroyed the parasite which underlies and are causative of that disease. I applied sulphur and carbolic

acid through their feathers and killed the lice and combining oil cake meal in their soft feed with meat and wheat and scalded, crushed corn ; in short, after keeping, like a christian should, for awhile, I got the birds back to constitutional good health and they began to lay. Every fertile egg then hatched and the chicks did well.

Now, reader, suppose the eggs from these hens had been at first put into a "Perfect" or "Success Hatcher" a "Climax," "Monarch," "Pacific" or "Eureka" Incubator ; how easily it would be thus to prejudice the prospects of the finest of machines. Therefore it seems pertinent in this place to consider, briefly, some of the influences that affect the success of scientific incubation. These relate, principally, to the place and surroundings of your machine and to the quality of the eggs.

1st., Then, after securing a good incubator, set it up and operate it in a room that is large, well ventilated and light. Why ? Because the gas and emanation from the incubating and hatching eggs must not be confined in the room. A cellar is, therefore, utterly unfit for such work because it is usually dark and full of damp and heavy air and difficult to ventilate. I urge this from the dictates of science and common sense and experience. I think the reason above assigned are sufficient. It is better to build or rent a special house for hatching. After this the thing of first importance is the eggs. Without the very finest, healthy, fertile eggs no system of incubation can ever hatch out healthy chickens. Pure, fresh and fertile eggs are indeed the beginning and the end of everything that pertains to successful poultry culture.

Remember, then, the *requisites* for your incubator.

The influences that surround your machine as regards pure air and light and comfortable quarters and, above all, consider the character of your eggs.

The egg is, strictly speaking, *a seed*, and when fertile, like other seeds contains a germ or latent vital essence. The Incubator is simply a well devised machine constructed especially to furnish the essential conditions which nature requires to awaken within the eggs, and so set in motion, those chemico-vital changes which eventuate in the development of the chick and the reproduction of its species. At this point it seems so pertinent that we emphasize the *importance of the egg* and again affirm that every consideration in poultry culture must relate to the actual condition of the egg and constitutional

condition of the parent birds. Are these breeding birds too nearly related or long inbred? Are they ill kept, affected with scaly legs and vermin? Are they enfeebled from insufficient food, or otherwise unwell from over, or improper diet, and so suffering from indigestion? Are there too many females for the male from which the eggs are weakly fertilized, or are the males too old, or young? All these and other influences affect the eggs and so often, if fertilized at all, are worse than worthless as science assures us that, the progeny must represent the actual condition of the parent *when begotten*. Therefore, if eggs be furnished under the adverse influence above suggested, the chicks, if able to survive the ordeal of incubation, will shortly after die from utter innervation. Eggs from ill-conditioned fowls scarcely ever completely hatch. The chicks have insufficient vital force to absorb the animal matter in the eggs and so break the dead and brittle shell, such, you know, is the ultimate act of incubation.

But it requires strength of circulation which comes from healthy vital force. Go back, then, of the egg and learn the stock that supplies them.

Again, as Incubators require at once hundreds of eggs and while this requisite quantity is accumulating, the first are kept so long as to utterly unfit them for incubation.

Experience proves that eggs will hatch after being kept for weeks and after crossing the Atlantic Ocean, but the chicks are usually feeble and unprofitable. My importation of eggs from England has always proved a failure.

Eggs subjected to incubation within a week are much to be preferred as furnishing a better hatch and stronger, healthier chicks.

I am aiming to impress the great importance of using only the freshest and most reliable eggs—bear with me in the further suggestion of still another class of adverse influences, all relating to imperfect eggs.

An egg is never nearly spoiled. It is absolutely good or bad and spoiled and introduced for incubation will generate in this the foulest putrefactive changes and so taint the entire atmosphere of the Incubator with the influence of debility and death.

It is easy to imagine the influence of such dreadful odor on all the rest of the healthy eggs and yet, under the operation of any or all of these adverse influences that have often wrecked the result-

*the machine was a perfect one and operated right, yet, received all the blame from persons who were unacquainted with the real cause of failure.*

In many of my first experiments I used two thousand eggs each time unmindful of all the dangers to which I have adverted. I gathered my eggs at first from any and every source, from stores, from farmers, from peddlers and from every possible place, whence they were bred promiscuously incestuously, uncared for and ill-conditioned, scantily fed and never sheltered, and, withal, a prey to vermin and every plague that infest the mongrel flock of the shiftless farmer. These eggs were further subjected to the cold inclemencies of spring and to careless handling and hauling and yet, under all the unfavorable circumstances just cited I hatched out a little over 700 chicks and half as many died in the shell at various stages of development.

The machine then used was a modified Common Sense, in which the heat was irregular, the air and moisture both poorly applied—all these unfavorable conditions considered, the hatch was not at all discouraging. I saw at once the defect in eggs and the Incubator, and inferred what I have since proved, that, if thirty per cent. could be hatched with such imperfect arrangements over ninety per cent. could be secured by an Incubator that more perfectly applied the three essential conditions of incubation, and with perfect eggs.

My vast horde of little chicks was thus unadvisably ushered upon my hands with insufficient accommodations for them in cold weather and so, of course, a greater portion died. Some 250 survived under every disadvantage. Other hatches continued to improve, as holes were bored through the machine, tin tubes inserted, and air allowed to enter, and, by direct application of moisture and observing studiously the necessities of the process, it soon became evident that a machine that could be relied upon to properly apply heat, air and moisture to its eggs would revolutionize the poultry industry. And these machines now do this duty perfectly.

The Brooder then used was worse than the machine. A top heat tank, warmed by lamps reflecting heat from a zinc roof down on the heads of the harmless little chicks, soon sufficated over 500, and impressed the following facts: The brain of anything is the depot, or supreme source of vital force, its blood is unlike that of all the rest of the organs being pure and perfect and finished before being sent

to the brain. It therefore, tolerates the fiercest cold and never is congested. But heat affects the brain adversely; it relaxes its large blood vessels and partially, or completely deadens their elastic resistance to over fullness and so is induced congestion, over-fullness, pressure upon the brain, dizziness and death.

The body, on the contrary, is one vast chemical laboratory for carrying forward the processes of digestion, for converting meat and bread into blood. These digestive processes being chemical in character must be subjected to higher temperature than the brain. From these data we proceed to study the *proper application of heat to the chick*.

What is afforded for our guidance from the mother hen? Her chicks envelope their bodies in her feathers and all around peep out for air. They press their bodies close against the hen and so the digestive system, *and not the head*, is especially affected by the vital heat of the hen. The top heat process allows of limited aeration; the rarified air and gas ascend to be again returned and born and breathed again until the twofold, unhealthy influences derange and destroy the chick. Such was my experience and, such are my views to the philosophy of the fatality.

Instructed by this experience, I next tried *bottom heat* after the following plan. Take a box, say six feet wide, and twenty feet long, by eight inches deep. Dig out the floor same size and let down the box on a level with the rest of the floor. Cover box and floor, all four inches deep, with dry sand and then convey the heat from lamps into the ends of the buried box by tin pipes. Put a tin tube in centre for a chimney to your lamps, and soon, the entire floor is warm. The chicks set down in the warm sand and the heat ascends, and so warms the whole room so that, if you have bottom heat, you soon have heat everywhere. If you sit down upon a warm rock and clothe the feet warm, the coldest weather on earth will not freeze you, but, apply this heat to the head and fail to extra clothe the feet and trunk and the effect, of course, will be fatal.

Make a plank house, cover and line it with tared felt and with the underground brooder or heater, the only remaining necessity will be a ventilator, which should be operated by a thermostat and valve such as register and regulate the temperature in the Incubators, and thus you can go to bed and rest assured that the chicks are comfortable under the right and regulated supply of warmth and fresh air.

The principle, of course, being the same as utilized in the Incubator. Well, my chicks did vastly better under the operation of this crude bottom heat contrivance, which suggested at once *this better method*, and ushered in a flood of facts and philosophy in its support. An elaborate article might be made most interesting and instructive, which considered in detail, the effect of heat by those two processes of application upon the brain and the delicate digestive apparatus of the chick. Suffice, for the present, with a single suggestion. The pertinent thought then impressed me that the digestive system of early infancy is always properly protected with flannel covering, with especial care, while the head remains uncovered. The birds, in a state of nature, line their nest with wool and feathers for the especial protection of the lower body of the delicate little birds, while the heads remain uncovered. The Indians of the wild west understand the essential conditions of health and to this end they dig a pit and build their fire, and, wrapped in their robes, lie around in a circle with feet to the fire. In all cases the head is uncovered. We, therefore, conclude that when lines of philosophy coverge from the realms of science and nature from every direction and all lead up to a fact that the fact is founded in nature's laws and must be essential:

We conclude from all the foregoing, and, from experience that the application of heat from above upon the head of a bird is unnatural and often fatal and not sustained by science, nor, as we have seen, by analogy in the heat supplied by the hovering hen.

We are not inclined to be captious on this question, but simply submit our experience, our conclusions and, as usual, our reasons. If others can contrive some method to modify the evil influence of heat reflected on the head we shall be glad to greet you. But the bottom heat brooder, we fully believe, will be the great hovering hen of the future. After thus much of digression in the direction of suggesting the utter folly in hatching out chicks until fully fixed to care for their comfort, we resume the recital of our experience with scientific incubation.

After the improved Common Sense contrivance we had built another 500 egg hot air Incubator ventilated by tin pipes passing perpendicular up and down along the sides of the machine and turning at right angles and entering the egg chamber below the eggs above the moisture pans. The whole space was partitioned into four de-

partments, each holding 125 eggs all heated from the one zinc roof, the purpose of division thus into separate drawers being to put in 125 eggs every week. The machine had a lamp at each corner and a central tube entering at the top as a chimney for all the lamps. But the machine was defective ; first, it did not evaporate sufficient moisture and ; second, it heated and cooled too suddenly, it had no regulator and so required watching Still it hatched sixty per cent. of all fertile eggs.

I concluded now to use setting hens in connection with the Incubator and so I gathered them in great numbers and set them on china eggs and when the chicks were hatched, put them under the hens at night. This seemed plausible, but, I soon found it impossible to put many hens in one house on account of constant quarreling and killing the chicks. A hen will gladly accept and care for the chicks after setting ten or twelve days as soon as the maternal instinct is awakened by a short period of setting, but, she is jealous of the presence of others and so it is only possible to keep the peace by putting the broods apart which of course requires so much house room that the hen system becomes too expensive and too full of care. I put them apart and in spring let them out, but in from 4 to 6 weeks the hens began to sing and seek their nests and the little chicks were soon left to die of cold and inclement weather. My experience is that hens that are worth their feed as egg producers are unfit for mothers, because they wean their chickens and resume the office of egg production before the chicks are fledged, the chicks become chilled and die of the many forms of indigestion. I have sought to remedy this by fixing a place into which the chicks alone could enter and eat and so starve the hens with a view to retard their laying, but while this will succeed it is full of care and cruelty. It will be found therefore impossible to prosecute a system of poultry culture *sufficiently large to justify our time where hens are relied upon to perform any other part than the production of the eggs.* This part of her work is susceptible of assistance because physiological science has afforded us that physical condition of habit and health in which the hen furnishes the best and largest number of eggs. She is simply a vital machine whose great office work is to lay eggs and this she *cannot help doing*, if, by careful feed and care her organism is kept in the correct condition. We have elsewhere noted that half fed and ill-conditioned stock cannot furnish healthy eggs and so we see that

science enters more extensively into poultry culture than many have supposed. Like any other great and growing industry its work must be brought at once under the auspices of classified knowledge. Everything, to succeed, must be well organized. The hen cannot perform two parts, much less three. She cannot lay eggs, set three weeks and carry her brood ten weeks and be of much service. During those sixteen weeks, under the old system, the most she could possibly yield would be an average of six to ten chicks during the four weeks.

Under the scientific system, where the labor is allotted, and the two parts that tax her powers the most are assigned to the machine, she may be made to furnish eighty eggs and so contribute over fifty chicks.

Thus the hen is kept continually active in the work for which science has improved and better shaped her, whereas science has only destroyed her capacity for the *other duties* that the new system devolves upon the machines.

In short, the hen thus improved for egg production is thereby utterly unfitted for anything else. She is educated to that end just as jersey cows are bred for butter and short horns for beef. Each, in its sphere, is excellent, but worthless elsewhere, and so, poultry culture must take its place in the great family of business industries with all its operations organized and each department of its labor specially allotted. Thus only can any great business be carried on and poultry is no exception. If the enterprise be left unorganized, if no account be kept of loss and cost and profit, if each hen be allowed to lay and set and carry her brood and thus, from 5 to 10 be fed and cared for and kept to do the work of one, when, controlled by sense and science as we have seen, then surely poultry culture is entitled to no confidence in the great fraternity of organized business industries, and, so, will continue to double her distance in the rear, or more than double her importation of eggs with each succeeding decade.

Such, indeed, is its record under the ancient system of unallotted labor of letting the hen lay eggs and then stop to hatch three weeks and then to hover six or eight or ten. Under such a system, and so long people are incredulous as to the actual net profit of a hen.

Well, our experience demonstrated the fact that *the old hen was infinitely inferior as a brooder than as an incubator of eggs.*

Remember all the time we are dealing with large numbers, our

subject is *poultry culture* and we are considering the question from the stand point of *a business*, and *from experience*. We found her jealous, offended by the society about her, and so, unsafe to set. We found she abandoned her nest, broke her eggs, tore up the tranquility of the whole setting colony, and killed the chicks.

Such, her history as a setter in society.

As a brooder she was all this and, in addition, eat more food than her chicks and of a kind more especially prescribed for the chicks, which, with great numbers became doubly expensive.

The further expense must be met in one of two shapes: Either the hen must have large room, or else the chicks were killed in quarrels. But those that survived all these and ever attained their liberty were enticed to trail through dew and, must be caught up at every shower of rain. But the worst of all, these hens abandoned their brood too soon and let them die of catarrh, or roup, or some other form of indigestion and so, again, we were driven back to the brooder thoroughly convinced that *successful poultry culture, on an extensive scale, can only succeed by the scientific system*. To this, then, we shall now confine our consideration.



## CHAPTER VI.

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AUTHOR'S EXPERIENCE WITH INCUBATORS CONTINUED. SUCCESS HATCHER, MONARCH, CLIMAX, EUREKA, PERFECT HATCHER. LAMP TRIP MACHINES. HOW TO FEED. HOW TO SELECT A LAYING HEN. LAYING STRAINS. THE USE OF THE STANDARD PRESCRIPTION FOR LICE. FEATHER EATING. WATER. SHADE. HOW TO CURE SETTING HENS. SCIENTIFIC INCUBATION. HOW TO DETERMINE THE RIGHT TEMPERATURE FOR AN INCUBATOR. HOW TO MAINTAIN IT. THE HEN'S AND THE HUMAN VITAL HEAT COMPARED. HOW TO BUILD A CHEAP AND GOOD POULTRY HOUSE.

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UR next incubator was a 400 "Success Hatcher," using, also, that company's brooder for very young chicks and the heater house brooder later on, with the most gratifying success. My faith in this and all the self-regulating Incubators is absolute.

I determined to confine my work exclusively to standard poultry culture on a large scale and so selected the several varieties I still breed, and, filling my machine with these fresh and fine fertile eggs I was delighted with a hatch of 94 chicks from 100 fertile eggs of which 82 lived and did well. I have since succeeded equally well and others have done better by giving the work more time and attention.

The Success Hatcher is a thermostatic, hot-water, self-regulated incubator of all sizes, and maintains its temperature and furnishes heat, air and moisture automatically and admirably. It is now being further improved by adding a circuit electric battery which operates the valve and at the same time depresses the lamp flame, and when the temperature is reduced, to the desired degree, the valve closes and the flame is again increased.

This same device done in another way is peculiar to the "Eureka," the "Perfect Hatcher," the "Climax," and "Monarch," and probable to others. This "Lamp Trip" is certainly a triumph of science

and makes the machine not only more reliable, but "a thing of beauty and a joy forever."

The hot water circulates entirely around the egg chamber and *beneath the evaporating pans of water*, thus, warming and evaporating the water beneath the eggs. We think no patient, intelligent person can possibly fail to successfully operate either of the Incubators herein advertised, because we have admitted only those we can cheerfully recommend. But, remember a brooder is just as essential a thing in this method of poultry culture as an incubator and without which the incubator, you must see, on a moment's reflection, can be of no earthly use to you because the chicks that you hatch *must be cared for promptly* and, so the *warm bottom heat brooder should await the work of the incubator*. Further on in this work we shall offer our idea of several plans for poultry houses and brooders which, we think, most admirably answer every end.

We come now to insist on the only proper function of the hen.

Do not call on them for anything but eggs, but study and develop her highest possibilities in this direction.

Experience has shown that egg production is a natural, physiological function and may be modified, increased or retarded by such influences as increase the condition, or unfavorably affect the health of the hen.

Scientific research has approximately placed the ultimatum of a hen's life work, in egg production, at from six to eight hundred eggs.

In a state of nature, or under the old system of poultry culture, the hen would consummate this life labor in about twelve years; whereas, under the modern improved method of comfortable housing, feed and care her general, physiological habit is so exalted that she lays the larger half, or about 450 eggs, in less than three years. The hen in the hands of the modern scientific poultryman, is simply an animate machine. Her physical condition is diagnosed and her egg production is stimulated or retarded at will, precisely as the milk flow is increased, or diminished in a cow. In a state of health, a hen can no more *help laying* than *feeling well* under proper feed. This fact came to me through unfortunate experience. I then raised my fancy Buffs by the setting hen system. I fed all liberally and I always found that within forty days my delightful old biddy resumed ovulation and left the chicks to combat the cold charities of spring-time.

I then selected the oldest hens as less liable to resume their laying and finally, I found that good or bad diet was at the bottom of the whole business and determined the activity of egg production.

I demonstrated the accuracy of this conclusion from the negative side by building an inclosure into which only the chicks could enter and eat and, so by starving the hen, or putting her on lighter diet, delayed her ovulation and she stayed with her chicks.

Again, there is such a thing as *strains* in all kinds of stock where-in the greatest difference of merit exist. The famous Stoke Pogis and Coomasse strains of Jersey cattle command incredible prices because of a characteristic certainty to transmit the very highest milk and butter merit to all their offspring.

The Felch, and Autocrat and Duke of York strains of Light Brahma, the "Orange" and "Connor" and "Old Gold" strains of Buff Cochins, the Essex and other strains of Plymouth Rocks have national reputation as egg producers.

A strain, then, of anything is only properly so-called, when by careful selection and culture there has been firmly fixed upon it some clearly defined characteristic, and so by selection and carefully feeding only the very best laying hens, a strain of superior excellence as egg producers, can certainly be built up which, of course, is of the very first importance, either in fancy, or commercial poultry culture.

Now, while *experience* with any animal affords the surest test of intrinsic merit, yet certain external features are often suggestive of superior high qualities even in a hen.

First, excellence in anything is strongly suggested in *faultless symmetry*. Give me a hen that balances well in all the standard sections and so approximates symmetrical perfection, and I will select her with confidence as a valuable layer.

Again, *medium sized hens* are almost always to be preferred as layers and thus we come practically upon the inestimable worth of the American Standard of Excellence affecting for good the most vital part of commercial poultry culture. Thus, too, is proved the wisdom in modifying its provision in respect to excessive weight.

Like that book of books, that higher standard rule that rises above all earthly wisdom and entrenches its worth and truth in the universal experience of every day life, so the good sense and real necessity of such a standard system for raising fowls, for any and every use, is practically attested in the experience of every intelligent student

of poultry culture.

The standard size and symmetry then, afford the most reliable guide in the selecting of a genuine, good laying hen. If you have not got a standard, purchase one from any poultry editor or breeder and thus build up a strain of laying hens for abundance of fine fertile eggs from such stock as we have suggested, affords the best possible foundation for successful incubation and vigorous chicks.

We can not too strongly insist upon the necessity of all this preparation if we decide to embark in this business as a profession. Of course, we can begin at once and work up to the position herein prescribed, but the sooner we secure our own stock and thus control our own egg supply the better by far will be our success; for, remember that the issue must largely relate to the quantity and quality of the eggs. To this end we have carefully considered and assented to the practical necessity of what has been said.

We comprehend the vast advantage of the scientific system, we perceive the impossibility of proceeding and pushing business as we intend with the cumbrous, quarrelsome hens as hatchers, and so we have selected from the best our self-regulating Incubators and the best brooders.

We have purchased a standard, have carefully selected and mated our stock, and now before we enter on the work of incubation, let us stop and carefully consider what we have on hands and how we shall shelter and feed and care for our stock.

We know no substantial house that could be built cheaper than the gable-roofed, or double roofed box house; that is, pine plank nailed upright to sill and plate, the cracks striped and the entire inside surface and roof covered with tarred felt. Such a house can be built any size and will be thoroughly dry and sufficiently warm. Let the house be wide enough, say 24 feet, to admit a 4 feet hallway through the center and leaving the pens 10 feet square on either side. Let these pens open into runs 10 feet wide and as long as convenient on either side of the building, fenced and partitioned with lath. Such quarters are only suggested, the cost must differ with location and price of material and labor at different places.

The more essential consideration now confronts us, what shall we feed? We answer *everything*. But, in winter, our poultry provender is necessarily so limited that a certain general dietary must form our staple food. For the morning meal, therefore, give equal parts of

corn meal, ground oats and wheat bran thoroughly scalded, adding pepper and salt, and fed warm at six o'clock, a. m. At ten o'clock hang a head of cabbage in each pen. At one o'clock feed scalded wheat and at six p. m. feed dry crushed corn. Vary the morning meal with corn bread in which there is plenty of lard and black pepper, and feed meat cooked in some shape once or twice per week. Beef heads chopped up into chunks and boiled with potatoes make the very best and cheapest food. Bone meal or ground oyster shell should be kept before the fowls and often put into the soft food.

Lice should be looked after every two or three weeks and when found apply through the fluff of each fowl a small handful of the following mixture:

Flour of sulphur 10 pounds; fluid carbolic acid 3 drachms; mix thoroughly with a stick in a box, say 12 by 18 inches long, with a strap across the top for a handle. Take each fowl that is suspected, or infested with vermin by the legs, rest the breast or crop upon the floor and gently sift the carbonized sulphur all through the fluff. The fowl when liberated will flutter and so send into every crack and crevice this *perfect specific* against all manner of poultry vermin and this, we assure you, is no small triumph; for, otherwise, your whole premises would be permeated with this plague which, creeping and crawling through all the feathers and over the delicate skin, would allow no sleep, would so disturb the nervous system as to induce an irritative indigestion and so wreck the whole enterprise.

Again, we say, *look after the lice* and as they are closely connected with filth, keep everything clean.

Filth and vermin, let me further insist, are fruitful sources of other ills. They debilitate and break down the powers of vital resistance and so expose the fowls to all other infirmities.

*Feed your stock liberally* and yet with judgment, not to fatten them but full to satisfy them.

*Feather eating* and egg eating never will occur when fowls are allowed liberal diet. The cure for that habit came to me from watching a neighbor's hens pluck all the feathers from the male. They ate the entire feather to get at the soft end, yet fresh in animal matter.

Supply oyster shell and bone meal and animal diet and hens will never begin these habits and will quit them if commenced.

These seemingly small matters are mentioned only because the author's purpose is to be practical and of actual service to all who seek

advice on such subjects from the experience of others. *The influence of small things* cannot be better illustrated than in the scourges of lice among laying hens. Like the coral insect operating silently and unseen away down under the ocean, they are unnoticed and unknown until, at length, they rear high up to the crested wave their dreadful reef that wrecks the commerce of the seas. And so, the ruin wrought by lice and all such seemingly small things, if unobserved and left to prey upon the flock of the poultryman.

*The medicated dust box* containing carbolized sulphur, is here suggested as the easiest and safest specific.

*Water*, fowls like everything else demand fresh pure cold water; not freezingly cold, but pure, fresh, and often.

In summer and in hottest weather every four hours and only enough, the rest turned out so that they may not drink the water when warm, which induces diarrhœa. Wash out the vessels every time you water. All this seems small but must be somebody's regular business, unless your yard be built in a circle around a fountain, or along a running stream. But the *fresh water supply* is an absolute necessity.

Shade, also, and green grass are essential to the health and comfort of fowls in confinement, shade especially.

When hens lay out their litter of from 10 to 18 eggs they usually decide to set, and then comes a crisis between science and the setting hen. Of course, the hen must succumb.

To effectually blot out her ideas of incubation in the shortest possible time the hen should be suspended. Take a lath frame one foot or eighteen inches square, tie a rope to the four corners and swing it up in the house with the hen inside. Supply her with feed and water and the air coming under her and her suspended movable habitation soon dissuades her from entering seriously on such a maternal enterprise. Meantime, feed her freely, the purpose being to put her physical system in the finest possible condition to augment her health to highest habit and so force her down from her artificial altitude again to honest, steady business.

We now enter upon the important process of scientific incubation, feeling that herein will soon be demonstrated the wisdom of all our careful preparatory work. We now desire to know precisely the proper heat at which to gauge our incubator and so we take our registered fever thermometer and passing it up the bowel of the hen

we find that at the beginning the vital temperature of a setting hen is *one hundred and six degrees*. The vital temperature of a human being in health is  $98\frac{1}{2}$  degrees and so we here derive much fundamental and practical information.

Let us stop to learn the meaning of this fact and ask why the fowl's temperature is eight degrees above our own? The purpose appears to point out in this higher temperature of the fowl an especial fitness for the work of incubation and, so, when left to herself, in a state of nature, the ordeal is wrought out in such perfection as only can we safely imitate in our scientific operations; for, *thus situated* only can the hen accomplish *natural incubation*.

A further providential purpose, doubtless, in this higher normal heat regarded the comfort and protection of the fowl from inclemencies and cold.

Again we seek to measure as before the actual heat *beneath* the hen at the beginning of her incubation, for then, her vital heat is highest; first, that she may longer starve and stay upon her eggs, and; second, because the eggs *demand this higher heat* to awaken within them the vital force, or principle. We find by actual test that, placed beneath the recent setting hen, her temperature will not be far from 103 degrees, and, to this we adjust our thermostat as follows: We will fill our Incubator with eggs and place a reliable thermomter on top and carefully watch the influence of the heat until the mercury rises thus, under the influence of heat to measure 103 degrees, we then advance the thermal screw to-wards the metallic bar until it touches, and so, at 103 degrees the electric current is closed, the valve is opened and the lamp flame is lowered and so held by the magnet until the heat in the egg chamber declines, then the bar contracts away from contact with the screw, the current is broken, the valve closes and the lamp flame again turned up, and so the temperature demanded by nature is thus derived, and thus guarded and governed, with perfect precision under the unerring operation of electric control. Thus can the first great essential to scientific incubation, the proper temperature, be *found at first* and *reliably maintained* throughout the ordeal of incubation.

There is no triumph of modern scientific truth better sustained by the test of practical experience than the application of electricity to governing the temperature of the incubator. It requires no special training, no education in the operation of electrical apparatus to un-

derstand and operate any of these self-regulating Incubators, because they do everything themselves but fill the lamps and turn the eggs, and some do turn the eggs.

But what practical lesson may we deduce from passing the thermometer into the interior and finding there the actual, vital temperature of the hen to be 106 degrees? Since we find her *external heat* to be *much less* and so allow the latter to guide our operations? We learn from this the highest vital temperature of the hen, that 106 degrees is the very highest heat that can be applied to eggs; since, beyond the highest vital temperature applicable to anything their offspring will suffer. Hence from this *internal test* we find that 106 degrees to be the highest heat to which we may subject the incubating eggs, and even this vital heat of the hen is full two degrees too high for the hen's offspring, or eggs, precisely as the weather in August, measuring 98 1-2 degrees of heat, the normal vital temperature of adult human life is much too high for human health. Thus the lesson that, though the temperature may run up to 106, or 108, or even 110 degrees for a very short time, yet, if even 106 degrees be long sustained in the Incubator the chicks will nearly all die in the egg, or soon after hatching. The proper temperature, therefore, for incubation is 103 degrees, as demonstrated and drawn by actual test from the operations of nature going on within the hen.

But let us dwell here for a moment for a few observations. After the hen has kept her nest for about ten days her comb turns pale, her weight and general robust health declines and she gradually loses her vital heat on through all the rest of incubation until we find, on actual test, at the end of three weeks from her first entering upon this duty with a vital temperature of 106 degrees that she now measures by the same thermal test a vital temperature of 102 degrees. But, the incubating eggs do not suffer from this constant loss of vital heat in the starving setting hen; but, rather this is a merciful source of safety to the embryo chicks because no sooner is the vital germ imbued with active life within the egg than the *circulation of blood sets up* within the shell and so the vital changes thus engendered within the incubating eggs *develope a heat within the egg* which more than balances the vital warmth that, as we saw, has left the hen. Thus it is that the hen may leave her nest and the incubating birds may wander wide in search of food. The circulating blood and inherent heat within

the egg is *almost self-sustaining after the first two weeks.*

But, let us carry this observation with us and note the operation of this physiological process *upon the temperature of hundreds of eggs within the Incubator.* This source of inherent heat within many incubating eggs would seem, at first, to fatally affect their temperature, or bring the pertinancy of the question within the scope of our inquiry into this subject. But, here the incubating eggs are just as safe from over heat as if beneath the falling temperature of the hen ; because, it will be observed, that the thermostat is within the egg chamber and adjusted to reliably hold the temperature from going higher than 103 degrees; it affects this thermal ventilator just the same, whether the heat be generated from the lamp, or emanate from the eggs, or both. Still, whenever the temperature ascends to 103 degrees, the electric current is called into action, the lamp flame is lowered and the valve flies open, the outside air enters and the heat escapes and this operation holds down the lamp heat entirely if necessary, and uses only so much of lamp heat, which, added to what is given off by the eggs, amount in the whole to 103 degrees ; and so the scientific process is purely self-regulating and absolutely reliable with this style of Incubators.

We have now set and tested and find our Incubator holds its heat for several days safely at 103 degrees. We introduce the eggs and let them entirely alone for two days, during which time we neither turn nor air nor in any way disturb the eggs ; because, up to this point and even later, the hen never leaves her nest nor turns nor uncovers her eggs. Why ? Because it will be found, by breaking the eggs, that it requires 48 hours of constant heat at from 102 to 103 degrees to imbue with active life the vital principle within the egg. Then, with unaided eye we can plainly see the heart beat and round about this little beating atom we observe the mesh-work of mesenteric arteries and veins—the brain and spinal cord and the crude outline of the little living creature coming out from the domain of the *chemical* into the *vital world.*

The subtile changes are so exceedingly delicate up to this point where the circulation can be seen and is actually established, that the instinct of the hen adapts her conduct to the eggs necessities, and so she hovers and heats them perfectly still. The question is here suggested, how long may eggs be subjected to 103 degrees of heat before those chemico-vital changes start, and hence would destroy the egg

from hatching, if withdrawn from the heat before the function of circulation and visible vital force is affected in the eggs ?

We think it unsafe to ship or disturb eggs that have been subjected to incubating heat over six or eight hours, for we may clearly see the enlarged and yellow areolar ring around the vital spot, the vitelis, after the first 12 hours of incubation. Hence, the necessity of the precept enjoined to keep the eggs perfectly quiet for two or three days from the beginning of subjecting them to incubating heat.

It is difficult to definitely determine the precise period when the *chemical changes will first be set in operation in the egg* under heat, but by bringing up the point may assist, somewhat, in saving many eggs from rotting that have been subjected to heat and cooled too soon.

It may be suggested, too, that eggs that are not hatched daily may be thus started by a hen setting on the eggs over night. All such eggs are certain to rot, if set or kept.

Well we have stopped to note this important practical observation; but we have had our eggs three days and nights in the Incubator subjected to 103 degrees of heat. We break an egg—we find upon one side a small congested speck and bending around, a little quivering point we trace the outline of the embryo bird. The little beating speck is the birds heart.

We now conclude it safe to turn the eggs gently once a day and put in our pans of luke warm water. Why ? Because at this period the hen leaves her nest for food. Why ? Because the vital changes going on in the egg keep up for a time the internal heat to which we have elsewhere refered and now we observe the hen to lift her body and with her beak to move her eggs about. Why ? Because to equalize her heat to all her eggs and to afford equal air to all ; and, further, by changing the egg's position prevents adhering to the side of the shell. Of this latter I am uncertain, since eggs have hatched that have never been turned. The experiment is quite easily made with separate drawers of an Incubator.

After the first three days the moisture pans becomes an essential. Why ? Because the high heat and consequent dry air of the Incubator demands moisture and will extract it from any source.

There becomes, therefore, a strong affinity for the moisture within the eggs.

To remedy this robbing the egg of its moisture the evaporation of water within the egg chamber keeps the air sufficiently humid and

the egg is not thus injuriously affected.

Experience, alone, has demonstrated the right relation between a given amount of heat, a given amount of water for evaporation, and the successful hatching of the egg. Usually, from a quart to three pints of water in 24 hours at 103 degrees temperature will satisfy nature's demand for atmospheric humidity in a drawer of one hundred eggs.

It is of prime necessity, indeed, our second great essential to successful incubation, that sufficient moisture be supplied. Why? Because nutritional changes of embryonic life are actively operative in the egg and these changes there, and elsewhere in all possible forms of life, whether in animal or vegetable life, *all changes*, must be effected *through fluid media*. They must be *carried on in a fluid state*. Water actually constitutes over 90 per cent. of everything that lives. There can be no change and therefore, no vital heat, and therefore, no life when the water of the object is reduced below 90 per cent. of the whole physical organism. Whether in the sap of the trees and plants, or the circulating blood of animal life, water affects all the atomic changes that underlie the life force; hence its necessity *here* where the life forces are operating in hundreds of eggs and where a rapid circulation in each egg is absorbing from the atmosphere the greatest amount of moisture it can contain.

But, we have seen the incubating heat of the hen is 103 degrees. The inquiry is pertinent, whence is supplied the requisite amount of moisture for this temperature when the hen hatches the eggs? We answer the high heat and active circulation going on in the egg beneath her, both being greater than her own, absorbs the moisture from the hen; hence her rapid reduction in weight beyond what is due to loss of food.

But certainly, we do not insist that the same amount of moisture for the same degree of heat, is demanded alike from the hen and from the Incubator; the reason being that the oily substance derived from the body of the hen, which, may be observed, renders her eggs sleek and shining, and very much unlike those subjected to Incubator heat for the same length of time.

This oily principle imparted by the hen closes, in part, the pores; but not enough to injure the egg, and so prevents the evaporation and loss of the water within the egg.

So the hen insures sufficient moisture to the egg while incubating,

by partly supplying moisture from her own body, and partly, by preventing the evaporation of the egg's moisture by the oily perspiration she imparts to it.

The Incubator insures the necessary moisture by free evaporation of water from the moisture pans, thus rendering the air humid and so enabling the egg to absorb its requisite supply, and, also preventing the air from drawing any further moisture from the egg.

Both methods succeed in doing the same thing by somewhat different means ; both fully supply the egg with the second great essential, which is *moisture*.

Thus, we insert the moisture pans the third day, or as soon as the vital changes begin to influence the internal upward heat and organization of the egg into higher form and structure.

We now continue to turn the eggs once daily until ten days and, thereafter, on throughout the period, two or three times a day. After the first week, or on the 6th or 7th day the whole of the eggs should be tested ; the purpose being to rid the Incubator of all infertile eggs—first because they can be cooked as food for chicks, and second, subjected to high heat and moisture they often decay and emit an odor that injures all the other eggs. For such purpose secure or make a tester, which is a conical tube six inches long, made of stiff rubber cloth, large enough at the base to admit an egg ; place the egg in this end, hold it between the finger and thumb of the left hand, the palm of the hand upward, so that the hand will not be in front of the egg, then apply the small end of the test tube to the eye, before a strong light, or the sun, and if the egg be fresh, or infertile, it will be clear and pink in appearance. If examined thus on the third day an expert can detect a small flocculus and red tint rapidly rise to the top of the egg on being turned over, this indicates the early changes in the egg when the vital functions first manifest themselves to the unaided eye ; but *then* it is too soon and unsafe to make the test.

But tested on the 6th or 8th day we find a dark and well defined spot somewhat like a spider ; then, if the egg be broken we find the little embryo snugly invested in a membranous sack that incloses the embryo and the substance of the egg, the enlarged vessels everywhere forming a perfect network through which are carried on, continually, the most active nutritional changes ; this circulating foetal blood propelled in rapid and rich supply to every part by the throb-

bing, beating little heart.

All this may be seen on breaking a fertile incubating egg at 8 days, or even earlier.

Then the head and eyes and all the parts of the chick are plainly perceptible.

If now the egg be mottled with numerous specks and intervening clear pink color, then the egg is usually old, or otherwise unfit ; but always infertile and can be safely broken.

If there is a large, dark body with light allowed to surround it every where and fluid be seen that seems to shake on motion something like thick fluid then the chick is dead. Then, too, the egg is usually motled. But, if the dark body after 12 or 15 days shall fill the egg, except one small clear spot at the larger end, which we recognize as the air chamber—the whole egg, besides be dark and full then the chick is usually alive.

Thus, the tester enables us at an early date to separate the dead from the living with almost unerring certainty and much more certainly when such fresh and perfect eggs are used as these preceeding pages have prescribed.

Pardon me, if we again insist that the quality of the eggs decides the excellency of the incubation, all things else being right.

The test should be made on the 6th and again on the 12th days ; first, for the infertile eggs, and, next, for those which were then doubtful and for dead chicks.

If at any stage there exudes a fluid, thick and sticky, through the shell, then the smell will indicate, also, that the chick is dead, or the egg decomposed and it must at once be removed.

Thus the test tube, the exudation from the egg, and the odor will enable you to detect and separate the good from the bad.

Thus we have advanced upon the progress of the setting hen, her rotten eggs often fill with gas and burst befouling all, and ruining the whole enterprise of her incubation.

After the 14th day the chicks have grown to almost fill the egg. The changes that have so rapidly been wrought are akin to the marvelous.

## CHAPTER VII.

THE INFLUENCE OF HEAT UPON THE EGG, CONTINUED. THE NECESSITY OF MOISTURE. ITS ACTION. HOW SUPPLIED BY THE HEN AND BY THE INCUBATOR. PURE AIR THE THIRD ESSENTIAL TO INCUBATION. PURE AIR. ITS COMPOSITION. HOW IT ACTS. THE INTERIOR AND EXTERIOR OF AN INCUBATING EGG. HOW THE CHICK IS FINALLY HATCHED. WHEN. ITS PECULIARITY AS TO SIZE AND NECESSITIES. THE BROODER.



T the close of the first 12 hours the egg exposed to incubating heat reveals an areolar spot upon the yolk of paler yellow hue, again 12 hours and this enlarges and so continues until at 48 hours from entering under incubating heat, congestion, or rather hyperæmia is seen around a central vital spot. Faster and fuller these small surrounding arteries extend outward and over the yolk until within a week the whole yolk becomes a bed of crossing, coursing blood vessels, all carrying continually outward and back the blood that receives its impulse from the little central, oscillating organ called the heart. Behind this little vital pump *somewhere presides a power*, we know not what, but call it "vital force." This vital current, for the circulating blood is actually imbued with the potent principle of life and hence a vital current, absorbs nutrition as it passes through the surrounding pabulum; and so this vital phenomenon, fixed and founded in the yolk of the egg, draws on the albumen *everywhere* within, and thence builds, from its base in the yolk, the bird's physical fabric by process of absorption of all the animal matter within the egg. This process requires three weeks. The animal matter all absorbed and the chick full developed from this substance, becomes the ultimatum of incubation. Then it only remains for the chick to make its exit from the egg, there being only left the brittle lime, the moisture all absorbed, at the point of sharpest contact the shell

crumbles and the chick comes out ; such is incubation.

But during this interesting ordeal the fluid state must be maintained of all this matter, thus absorbed from the interior of the egg, by the circulating channels of the living, growing chick ; and so evaporation is insufficient to meet the constantly increasing demand for moisture. After the first ten days of incubation, when the first, third and thinner fluid has been absorbed and left the rest more dense and difficult to absorb, because less liquid, the nutritional changes are much less certain and, hence, the death during incubation is largely *in the last stage*. Hence, we see that moisture is truly an essential, and now must be supplied in vastly greater quantity, than is possible by evaporation and so, after the first ten days, nature demands that the eggs be sprinkled. Moisture applied to the exterior, or outer surface of the egg is absorbed through the porous shell by the vital heat and circulation that are going on within. If therefore, eggs at this stage be freely moistened and exposed to the air, the absorption may soon be seen ; except when the chick is dead and then the moisture will remain on the shell and the educated, or experienced touch, or feeling of the eggs will determine at once, by the presence or absence of vital heat, whether the chick be dead in the shell.

We have now gone pretty thoroughly through the first two essentials to incubation ; namely, heat and moisture, and have not only affirmed their prime necessity as a fact, but have gone under the fact to show the philosophy, or the clear common sense that supports it.

We now proceed to the third and last essential, which is *pure air*. It is apparent to every person that fresh, pure air is essential to existence ; but, all are not intimately acquainted with the actual operation of this life giving agent.

Pure air is composed in largest part of nitrogen and oxygen ; the nitrogen being over three-fourths greater in the composition of air than oxygen and serves only to dilute and render the oxygen less dense and destructive. Oxygen thus combined with other gaseous elements of air is the grateful and essential generator of all the delicate chemical changes that evolve, or furnish the vital force. When food is taken and transformed from the solid to the liquid state, and in its onward passage converted into a milky, murky mass of *chyle and chyme*, and, coming on eventually to the lungs, it there re-

ceives this vital air, this element of life, *oxygen*, by which its color and essential character are changed, and thence it starts, carrying in its corpuscles this vital principle to every atom, which it influences in the perpetual life labor of incessant waste and repair. When an atom is oxidized, it generates that force that furnishes it, from the blood, a rich rebuilding of other atoms and so oxygen is everywhere the essential promoter of those destructive and constructive tissue changes upon which, alone, the life force depends.

What is true of the human organization is equally applicable to the operations going on in the incubating egg. These nutritional changes, here so actively operative are possible *only in the presence and by the power* of oxygen. Combined with nearly eighty parts of a neutral agent, termed nitrogen, it constitutes the atmospheric air ; and thus reduced in energy, it then excites, as we have seen, those healthful changes that are, indeed, the vital essence of all nutrition and vital phenomena and force, such the influence of atmospheric air ; such the essential influence of vital change of tissue atoms, or oxidation.

In other combinations oxygen becomes more active and causes combustion and so destroys by burning heat and, still, by combining eight-ninths of oxygen with one-ninth of hydrogen we have water ; hence the life giving principle of moisture and pure water in stimulating those vital changes that constitute what is called *nutrition*.

Oxygen, be it remembered, in pure air and water must be present as the promoter of vital action everywhere that it exists. Hence its essential service in awakening and sustaining life in the incubating eggs.

Thus, we may sum up upon this point as follows : The vital germ containing the life principle, being imparted by the male, and, from electric affinity finding its lodgement in the yolk of the egg, where it lies inert until such a time as the egg is subjected to those conditions that induce a change in the vital element from a state of latency into active life. The germination ; the areolar spot upon the yolk at 12 hours ; the congestion around the vitellus at 36 hours ; the beating of the heart at the end of the third day ; the floculus then perceptibly margined with crimson fringe and floating upward in the egg as viewed through the test tube : the dark, spider-like spot, with vessels running out over the interior of the egg at the end of the first

week ; the enlargement of this dark spot, and the appearance of light in the air chamber, or large end of the egg ; the increase of heat in the egg ; the entire egg becoming dark, excepting at the air chamber ; the light all around the egg with vibrating thick fluid indicating the death of the chick, also the mottled egg, indicating infertility ; the clear pink, unclouded egg, denoting a fresh or infertile egg, and the mottled egg with clear pink spots denoting no dark body, indicating an old infertile egg, and mottled with a dark body suggests a dead chick.

So much for the interior of an incubating egg as seen upon breaking the eggs at various stages, every day, and viewed through the test tube, before the sun, or in the dark, before a strong light.

The external evidence of incubating eggs are : A cold egg, twelfth day, denotes absence of circulation within, and hence, no life ; an egg that does not absorb moisture after the fourteenth day, when dampened, denotes no circulation and, therefore, no life ; an odor emanating from an egg, or a viciid exudation from an egg, with an odor or not, is proof of decomposition, going on within, and these poisons forced out through the pores by the expansion of the gas in the egg under heat and moisture.

If I am dwelling too definitely on all these details of incubation, my apology must be, I am following in succession, every step of nature, not as learned from books ; but as seen by me during a series of years, in the incubation of thousand of eggs.

Finally, the twentieth day the imprisoned chick has drawn its last nutrition from the interior of the egg, its vital heat and circulating blood have absorbed every particle of the substance of the egg *into the chick* and used it as food, until there now remains only the vigorous little animal, anxious to get out, and nervous from finding no longer any nourishment within the egg. All the moisture, all the animal matter being taken up by the chick, there only remains the brittle shell of lime, punctured by thousands of pores that allways break first at the bigger end of the egg. Why ? Because there the air chamber has kept the inside fluid from the shell by a special membrane and so the egg is always less moist and more brittle at the bigger end. There, too, the head of the little chick is turned for air, and so *there* the relatively sharper portion of the chick, the beak breaks through the rotten wall. When the beak breaks through and the chicks find fresh air it presses in that direction and soon breaks

away from all feeble resistance and so ends the period of its incubation.

Reader, I hope you have fully understood the ordeal of incubation; for the process of development from the first inception of life in the egg, on and on, to the end of incubation, is a perfect portraiture of the processes of your own and all other animal existence.

The chick is hatched and independent of the egg. In other words, under the influence of special essential conditions the egg has been vitalized and transformed from a state of inertia, or latency into a living creature. The egg being thus transformed the chick now claims our special consideration.

When first hatched a chick will actually occupy more space and look much larger than when three or four days old. The yolk, though all absorbed from the egg, is yet within the chick undigested and thus affords food for the chick for about thirty hours. During this period we notice the setting hen, if left entirely alone, to sit in quietude, hovering her brood and never offering them food. Her unerring instinct impresses her with the importance of keeping them warm. This proves to be an actual necessity to the safety of the chick, because the yolk of the mother egg is yet within the chick under the process of absorption and complete digestion and so this delicate vital function must be consummated under elevated temperature. Hence the habit of the hen in hovering her young almost exclusively for several days.

The first necessity, therefore, for the newly hatched chicks is *not food*, but a dry and warm place, well ventilated and protected from draughts or chill or dampness. Why? Because, if food be forced upon a delicate digestive organ, already doing the full measure of its duty, the result must be indigestion or disease. This we often see in little chicks a few days old, and this error, of too early feeding, has injured the Incubator.

Again, the chicks must not get chilled for the first few days. Why? Because cold checks chemical change, and such chemical or vital changes as this absorbing and digesting yolk of a very young chick being thus chilled and blighted, the result must be indigestion and disease and death of the chick. This is all important and the source of so much prejudice because of failure to raise the chicks. Look to the brooder.

From all the foregoing we think it will be conceded that a dry and warm place to put the little chicks immediately after removal from the Incubator is the only safe and sensible procedure.

A brooder, therefore, becomes as much of a necessity as an Incubator and yet the brooder is always almost overlooked and ignored by the majority of those who buy an Incubator.

Friends, reflect a moment, what possible use can you have for an Incubator, but to hatch chickens? and without a brooder how shall you protect and preserve the temperature proper for swarms of lit-chicks. The brooder, then, becomes a *pertinent consideration*, in this connection, and must be introduced to public acquaintance in every text book or article that assumes to advocate the scientific system of poultry culture.

We have elsewhere in these pages referred to this subject, and advocated what we believe to be the best, most practicle and cheapest of all brooders yet introduced to the public. Let us enlarge upon the idea and present several plans.

First: the *inverted box brooder* 20 by 6, or 8 ft. *let down in the ground floor*, heated by lamps that enter the box by tin pipes at the ends, with a tin pipe in the center for chimney for all the lamps. Cover the top of the box with sand, all on a level with the floor, and soon the *whole sand floor* is warm, and the radiated and ascending heat *warms the whole house*. Thus we combine a *building and a brooder*.

The *building* may be made of upright pine plank lined with tared felt, and roofed with same, and so rendered very dry and warm. On either side, on a level with the floor, small doors or holes may be made, through which the chicks may be allowed the liberty of the outside inclosed run about the house; when chilled, they may return in upon the warm floor. Thus, practically, you have all the advantages of the bottom heat brooder, at trifling cost, and on a very large scale, without the inconvenience of having a brooder in your way. Thus, too, it is impossible for chicks to pile up and crush each other.

Building and brooder No. 2: Procure a small steam engine, from which cast iron pipes shall run the full length of the building, and return parallel with, and two feet from the first, and so on, until the whole width of the floor is covered, the last returning pipe to re-enter the boiler below the exit of the first. Then cover the pipes with

dirt and cement and sand over all and thus the engine will propel the hot water through all the pipe and thoroughly warm every part of the floor building. The heat may be gauged, either in the engine or where it is distributed in the building. The Perfect Hatcher Company, Elmira, N. Y., advertises to do that work. Also the Success Hatcher Co., Lancaster, Pa.

The engine will cost \$400 or \$500, but the extent of its services may thus be sketched. It possesses force enough to carry water everywhere even hundreds of feet. It will enable you to attach rubber hose and when the house needs cleaning, remove everything down to the cement floor, which should slope each way from the center, and then wash and scour the floor with hot (carbolized) water. It will enable you to cook your feed by scalding water or steam, and so save half your feed which would pay for the machine each year. It would furnish the motor power to shell your corn and to grind all your feed and so you could fatten pigs, poultry and ducks with all ease, in great numbers and very cheap. The engine furnishing the motor power for shelling and grinding, for supplying the hot water, for sending it in rubber pipes to any place to steam or scald and so soften the food, besides furnishing heat for chicken nursery.

Remember first, that cooked, or steamed, or softened food, when thus ground and mixed as we shall soon prescribe, is the best possible preventive of disease and the foundation idea in successful poultry culture. Why? Because ground, softened food fattens fast and induces rapid growth. Why? Because over half the labor of digesting is done by thus grinding and softening. Chicks or pigs or ducks cannot get too fat while growing and so this form of food warm and ground and softened imposes no labor on the digestive organs, and thus the young stock may be pushed rapidly forward, built up in physical vigor above disease. Thus one half the feed bill may be saved and the young stock strengthened against the adverse influence of inclement and cold changes and from all the indigestions.

Aside from the brooder, as thus connected with the building, I may safely commend the different make that are advertised in the pages of this publication. They are all excellent within their limits and for all who cultivate less than six or seven hundred chicks are all-sufficient.

## CHAPTER VIII.

FOOD. FOOD IN ITS RELATION TO LIFE. FOOD IN ITS RELATION TO HEALTH. FOOD IN ITS RELATION TO DISEASE. FOOD ANALYZED. FOOD ADROITELY DIRECTED BY SCIENCE. FOOD IN ITS RELATION TO FAT AND WHAT FAT IMPLIES. TABLE GIVING ANALYZING DIFFERENT GRAINS, AND GIVING THEIR SPECIAL AND RELATIVE VALUE AS DIET FOR VARIOUS DUTIES. FORMULARY OF FEED. FEED FOR LITTLE CHICKS RELATIVE VALUE OF DRY AND COOKED FEED. POULTRY FOODS OR TONICS.



WE now confront one of the most important, one of the essential subjects of poultry culture. It underlies everything, it is the power that impells all other forms of force, it furnishes blood and brain and bone and feather and flesh and is, indeed, the power behind the throne of vital force itself. We refer, of course, to *food*.

A chapter, then, demands its proper place in this connection devoted to poultry diet.

If the foregoing be true, then, we think, all will concur that there is scarcely a subject within the wide range of poultry culture so really important as *poultry diet*.

We shall offer in this connection a few suggestions upon intelligent scientific feeding. The excellencies of everything are first induced by fine feeding. The marvelous milk and butter yield of Jersey and Holstein cows were first secured through formidable bills of feeding until these characteristics became established and were transmitted, and thus, the so called "strains of pure blood" are built up, all having their origin in special diet directed to accomplish the end in view; but all emanating from fine food, selected diet, elegant nutrition, which ever is and always was, and ever will be, at the beginning and at the bottom of everything available. Even religion will thus more perfectly bud and bloom and ripen her precious fruit, for man

is a monster of hideous mein, a savage beast, and utterly incapable of keeping the least of all the commandments on an *empty stomach*

Science has analyzed the brain and found it to contain *phosphorus* and, where this element abounded most, the intellectual faculties were relatively enlarged, and, so in dementia or melancholia, or conditions that suggested impairment of the brain power, *phosphorus* was suggested, and soon established its claims to confidence as a remedial agent.

Again, by analyzing the waste material of active brain workers, it was found that phosphorus was found in overly relative proportion to the rest of the waste material after specially prolonged or arduous intellectual effort, and, so science began the search for phosphorized food and found it largest in fish and oysters and eggs; and so these articles are universally conceded to contain the higher intellectual elements of brain food.

Again, nitrogen is largely found in muscular tissue and so science has sought for such food as was richest in this essential for furnishing the greatest amount of muscle and found it largest in *wheat* and *lean meat*.

Thus, special kinds of food, like special drugs are *elective in their action*, operating upon and affecting certain parts of the system exclusively. Thus, *epicac* affects the stomach; *aloes*, the bowels; *nitre*, the kidneys, and; *opium*, the brain and, therefore, it becomes self-evident to all that diet, like drugs, may be adroitly directed; and, under the auspices of sense and science may be so employed as to serve the poultryman's purpose whether that be to fatten for market, to develop the production of eggs, or to stimulate the general development of his growing chicks.

Let us illustrate: We feed our stock for various purposes; our chicks we aim to rapidly develop in every direction. We feed our breeding birds in the direction of the fibrous and the muscular, to the end that they may be active and vigorous and so best fitted to sustain the heavy demands continually made upon the constitution that must freely furnish the richest nutriment in hard shelled eggs; and, again, we feed to fatten our fowls, so fast and fully, that they may not lay and so the sooner be ready for market. The same nutrition will not answer all these ends, and so, we tax our acquaintance with Poultry Dietetics, and according to the indications as afforded us by the researches and dictum of science, so we differently direct

*diet*, as we differently direct drugs, to do a certain, definite duty.

Suppose, in fuller illustration, that we feed our breeding stock on corn, combined in fullest measure with everything else they will eat. The result must be an over production of fat; and, with such condition, an end to all activity and ovulation, because science and experience, both, assign to corn the highest potency in producing fat.

*Fat* is not an indication of special strength in any physical function. The Hon. S. S. Cox declared in Congress that, "fat overlaying abdominal muscles, never produced a Disraeli nor a Gladstone."

Excessive fat, qualifies a bird or animal only for one thing and that is to die. It indicates, in breeding stock, the strongest evidence of injudicious feeding. Here, then, is the most important problem that the breeder can confront, since color and characteristics, good or bad qualities, health or disease, life or death, stand in direct relation to what and how we feed. All are affected, and doomed, in one direction or the other, by *diet*,

Let us remember that perfect digestion, that is, where there is a proper balance between the waste and the repair and the elimination going on in a living organism, when digestion is thus perfect, we have a condition of *physiological ease*, which is health. But, when this desired state does not obtain, and we have indigestion from any cause, as from improper food, or from sudden changes of temperature, then this indigestion implies a condition of *physiological disease*, which is, more or less, in the direction of death.

To demonstrate the foregoing facts and to furnish a reliable index to intelligent feeding we respectfully offer the dictum of science on this subject in the subjoined table which expresses the comparative dietetic value in each direction and the chemical composition of different grains in building up the animal organism. With such facts before us we have only then to comprehend what condition we require in our stock to best promote our purpose, and then select such diet as the following formula suggests as best adapted to induce that desired condition.

## Chemical Composition of Cereal Food.

KIND OF GRAIN.	Nitrogenous, or Flesh and Muscle producing matter.	Starch, or Fat producing matter.	Dextrine, in which there is small nutrition.	Fat, oily matter.	Cellulose, small nutrition.	Minerals, Bone producing matter.
WHEAT.	18.00	66.80	7.50	2.10	3.10	2.50
RYE.	12.50	64.65	14.90	2.25	3.10	2.60
BARLEY.	12.96	66.43	10.00	2.76	4.75	3.10
OATS.	14.36	60.59	9.25	5.50	7.06	3.25
INDIAN CORN	12.50	67.55	4.00	8.80	5.90	1.25
RICE.	7.50	88.65	1.00	0.80	1.10	0.90

From the above, chemical science assures us that wheat is richer in nitrogenous material, or flesh and muscle matter than any other grain by about 30 per cent. The minerals, such as lime, soda and potassa obtain largest in oats and barley, while corn and rice represent most prominently the oil and fat producing diet. Hence the scientific deductions that accord with all experience, teach that young chicks should first be feed on wheaten bread and later with fine cracked wheat. Why? Because such is by far the most nourishing diet. What then, is the condition of the chick? The yolk of the mother egg, which represents 30.7 per cent of fat, is yet not fully absorbed and digested. It, therefore, needs no fat producing food, rather under such conditions, the tender life most needs such food as will soonest make it muscle and strength and flesh instead of fat. When eggs are fed avoid the yolk; but the white of eggs and well-drained milk curd and fine chopped, lean meat and white bread and fine crushed wheat all belonging to that class of elegant nutrition which represents the rich, nitrogenous or flesh and muscle food and suited especially where ever physical strength and endurance are demanded. But, shall we not feed corn to young chicks in fine, cracked form, in bread or in the form of dough? We answer in the name

of science, No ! not for one full week. Why? Because, as we have seen, the chick when hatched is *over fat and weak*. We therefore, seek such diet as shall add no further fat, but rather flesh and muscle and bone and strength.

Well, what does our formulated table furnish? First, it suggests that wheat will give the flesh and muscle and strength; and second, that oats and barley will make three times more bone than corn. See table. These, then, of course, should first be fed.

To formulate the proper diet for chickens under two weeks old we suggest the following: Crushed wheat 20 pounds; ground oats 15 pounds; ground barley 10 pounds; flour of ground oyster shell 1-4 pound. Mix thoroughly with hot sweet milk, or hot water or bake into bread and feed warm and often, but sparingly, only so much each time that all will be eaten. This, with well-drained milk, curd and coarsely crushed wheat should form the main diet for the first two weeks. Cooked milk is the most elegant diet at two or three weeks old.

All this is especially relished by the chicks because it is precisely what they need. There is no guess work about this business; but actual science, which is only another name for classified common sense.

Chicks kept dry and warm and thus fed, grow fast and strong and need no vile hen to hurry them out and about, into dew and dampness and death.

This much for the first two weeks, after which add to the foregoing formula; 20 pounds of corn meal, and either steam or scald and so soften the whole mass before feeding. Young chicks for the first six weeks should be fed about as often as a babe the first six months, which is every three hours.

After three weeks, dry cracked corn and wheat may be given freely, especially in the afternoon. I mean rather to say, dry feed should not be freely fed in the morning. I am not certain that it is better to feed dry feed at night. The universal idea seems to be that a chicken must be occupied all night is digesting dry food, so that it shall be kept secure and safe from the evil effects of hunger and cold. Hence, they say, fill the crop with dry grain, which is longer and more difficult to digest.

But, honest reader, is that correct? Do we advise such diet for little children on going to bed? Do you select for them onions, and

pickled pigs feet, and hash, and cabbage, mince pies and fried pork? In short, are not the laws of digestion and of physiological life operative to a similar end in all animal organisms? Do you believe a three year old child would rest and grow and do as well on a stomach full of dried apples, or popcorn, on retiring at night as if fed on milk and bread, or milk and mush?

Then, which idea is correct, to feed a three months old chick on going to roost, until his crop is distended with dry wheat or dry corn, or fill him equally full of the same material, crushed and softened by hot water and so made easy for his little organism to digest? In both cases the *same nutrition is afforded*, but in the one way his digestive organs are *worked all night* and so are robbed of their proper rest, while, under the *ground food-diet* the most difficult part of digestion is done when the food is swallowed. The nutritional changes go silently and easily on, the child or chick is soon sweetly unconscious and covered all over in the quiet and healthful embrace of refreshing sleep.

I would gladly enlarge and press the general adoption of the ground food idea for chicks at night, only I have advocated the other side so blindly and so long that it seemed consistent here only to place the two plans in comparison and ask you to think for yourself on everything and be original, even in poultry culture.

Well, what does the foregoing table suggest as the most suitable diet for breeding birds? We answer that wheat, in various forms and combinations, make the most excellent diet for laying hens. It may be fed alternately as *bran and shorts*, scalded and fed stiff and warm with pepper and salt, or *steamed wheat*, or combined with other food, as in our *first formula*, it may be either *scalded*, or *baked into bread*.

Whole wheat and crushed corn at noon, and *steamed corn and wheat at night*.

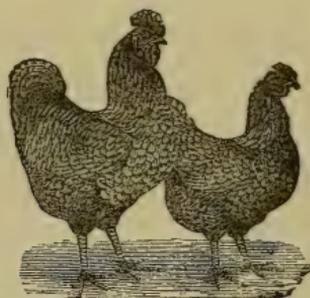
Be careful not to get the stock to fat, especially asiatic stock, meat, in the form of boiled beef heads, cooked tender, with potatoes three times per week, will make hens lay by putting their system and health in finest possible condition. Any other method of stimulating egg production is ruinous.

The various nostrums known and sold as poultry food are good to the extent that they increase the fowl's general health. Such is the great merit of "The American Poultry Food."

The best poultry food for stimulating egg production is elegant nutrition rightly prescribed and cleanliness, warmth and perfect comfort of fowls.

Ground oyster shell kept dry and where the fowls can find it and sulphur supplied in soft food a few times per week and the flour of ground oyster shell and ground black pepper and oil cake meal and charcoal, or what is better, parched corn ground coarse and mixed into feed, make up the most thorough of all appetizers and poultry tonics that we have ever yet tried during the laying and molting seasons, when the greatest possible draft is made upon the system, and when there usually comes, in consequence, those nervous prostrations, those green discharges, those irritative indigestions which constitute the essence of chicken cholera. What shall we do for these conditions, I answer kill all the lice, keep everything clean, feed flax seed, or oil cake meal, and black pepper, and flour of oyster shell, and sulphur, and charred corn meal, in steamed and crushed food. Put oil cake in fresh water and give three or four times a day, throw out one hour after, so they may not drink the water, either too cold or warm. *Have plenty of shade and green food and, thus do not let the cholera come.*

Unless these precautions be considered and heeded, unless the poultry breeder perfectly and practically understands that there are certain seasons of the year more rife with these relentless poultry ravages than others, and at the same time is fully informed *why this is so*, these insidious and subtle scourges will certainly fasten their footing in the midst of your flock.



## CHAPTER IX.

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CHICKEN CHOLERA. WHEN IT MAY BE EXPECTED. THE CONDITIONS THAT PREDISPOSE TO IT. THE REASONS WHY THOSE CONDITIONS GIVE RISE TO CHOLERA. SCIENTIFICALLY AND FULLY EXPLAINED. THE CAUSES OF CHOLERA. WHAT CHOLERA ACTUALLY IS. THE ORIGIN. HOW IT SPREADS. ITS CAREER. WHEN AND HOW TO TREAT IT. CASES REPORTED. METHODS OR TREATMENT. FALSE NOTIONS OF CHOLERA EXPOSED. POPULAR PRESCRIPTIONS CRITICISED FROM A SCIENTIFIC STANDPOINT.

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HICKEN *cholera*, though it may come at any time, is peculiarly prone to present itself during the hot summer and autumn seasons, Why? Because, then, those conditions out of which it is born, are always present. Then fowls are exhausted by ovulation, then they begin their annual molt, the new feathers as they come out deplete most heavily the life forces of the already enfeebled fowl. The new appearing plumage counter or *draw away the nervous influence that digestion demands to enable it to be perfectly performed.*

The *food* must now be *softened* and *ground* and *rendered easily digestible* or else it proves a source of digestive disturbance, irritation is induced, the crop fills up with mucous fluid, the fowl becomes feeble, the constructive changes are checked in the system and hence nature no longer calls up through the palate for further food, and hence the "fowl has no appetite." Every other element of digestion has stopped its function. Vital force is no longer generated. Destructive changes, and constant discharges continue to exhaust the fowl, and soon its flickering forces fail. All its nutritional operations are over, the fluids pour out of the relaxed system, and death results from *exhaustive indigestion.*

The causes that first induces this vital degradation: that first disturb the healthful harmony of digestive changes are, first: excessive

heat; second: *moulting*; third: *warm or impure water*; fourth: *an irritation of the mucous membrane of the stomach and bowels from depression of over work, or over heat, or the drawing off of the vital forces by fledging plumage, or sudden exposure to dampness or cold*; and fifth: *indigestible food, or food not especially easy of digestion and suitable to this condition of the digestive system.*

Vermin are also propagated most plentifully during these hot months, and their influence in breaking down the health and vital forces through *nervousness* and *indigestion* has already been sufficiently set forth in these pages.

So much for the conditions that are *causative of cholera.*

Other causative influences *come direct from the disease itself*, such as putrid discharges, and these are properly a different set of influences and are commonly called "infections," when the fatal influence is operative immediately among the fowls, or "contagious" when caught up in the humid, heavy atmosphere of night, or damp weather, and wafted over fences and fields and through other flocks, fomenting and thus finding its way among the fowls of whole sections; it rises at length to the dignity of a general epidemic and defies all doctoring.

Under the auspices of such wholesale evil every effort is often *impotent*: every drug is worse than wasted. It is like the dreadful freshet that is fed from ten thousand fountains, or like the terrific cyclone that generates electric life by attrition with all it touches until at length, it pours an awful avalanche of endless, electric, eddying fury, into the very center and soul of the fearful storm. Such are evil agencies when once in motion; when once they are widened in their work, and broken beyond all bounds; such is poultry indigestion when once it emanates in a home of disordered hygiene, when first it springs from famine and filth and assisted by all the agencies that we have sketched; when thus it starts, it is indigestion, it grows into cholera, it soon mounts upward on the wings of the wind, and becomes contagious and so widens and deepens into the dreadful cholera epidemic. Then it is indeed dreadful. Truly a "pestilence that walketh in darkness and wasteth by noonday," the ghastly ghost that will not down at your bidding, but which laughs at your calamity and derides the universal distress.

Well, what can science and experience suggest for such a state, for such a poultry plague? They both declare it is like sin, or anyother

wrong influence, it must be treated early, if at all. It can only be successfully treated in the early stages. How then? By carefully regarding the diet and considering the condition of the fowls during the hot and dangerous season of moulting in summer and fall and stimulating diet easy of digestion. Prevention by proper care and diet constitutes the cure for poultry cholera. But, do not wise men claim to cure the worst of cases by special drugs, or what they call specifics?

For this reason we have gone back of the so-called cholera, and exposed its origin, have acquainted you with the *conditions* that are *causative* of the scourge, that all might plainly comprehend the fact, that the most that any doctor ever did was to *produce a condition*; if the condition exists that must produce cholera, the only sensible thing that human agency can do, or attempt, is to change the conditions. Other doctors may claim to cure, but I never knew a mortal man to do such a miracle.

I have often changed the conditions, but, *nature*, or a power that presides still higher always causes the force that relates to life to bring about the cure.

But don't you give drugs? Yes, but only to produce a condition, and mostly to assist digestion and never when the vital forces are stopped.

But hasn't a French savant of science by name of M. Pasteur persuaded nature to impart to him the true panacea for all this dreadful poultry plague? And can you definitely define what he actually does, to forestall the force of this agent of evil called chicken cholera? Why, M. Pasteur secures and dries the blood of a bird that is thoroughly infected with cholera, and dissolves and injects this poisoned fluid into the blood vessels of a healthy fowl, and so he claims to be able to destroy the susceptibility of this doctored system, to receive the infection from all the vulgar agencies that are causative of cholera.

In short, M. Pasteur maintains that all the evil genes that engender cholera are barred by this simple procedure.

Another foreign celebrity has more recently arisen above the horizon in the great German Empire and has beamed out over the intellectual waste places of the rest of the world the full effulgence of his scientific force. Dr. Koch of Germany, has excited the highest hopes of humanity everywhere and awakened a scientific interest in pro-

fessional circles second only to the triumph of Jenner when he discovered and demonstrated the protective power of vaccination against the scourge of small pox.

This German savant assures the world that he has discovered in the blood of cholera patients, by microscopic aid, certain animalcular existences, a species of Bacteria or Fungi of such infinite fineness and yet such aggravating influence that they irritate the nervous system, poison the pabulum of tissue or atomic nutrition, and so become causative of asiatic cholera.

This great discovery has, at least, the negative merit of being novel and new and difficult to down. It has stimulated the most exhaustive scientific research, and the result has dug about and destroyed the foundation of the Doctor's fame, since some reckless scientists have swallowed, injected and freely taken these living germs into their system suffered no discomfort.

Even so may the large lumbracoid worm be found in cholera patients and yet not stand in a causative relation to cholera.

The fact, we think, is well founded, that cholera originates in in-nutrition induced by excessive heat, unhealthy food and water, and air. Add to these mental or physical fatigue, or any depressing influence, and nutritional changes are arrested, repair is stopped and waste is increased. Vital force then begins to diminish, the blood vessels relax, and their fluid contents flow out into the intestinal track and are expelled from the system; the blood becomes too thick to circulate in the smaller vessels from loss of water, the extremities and skin grow cold in consequence and death closes the scene.

Such is cholera, differing but little either in the fowl or the human family.

In this disease especially, a grain of prevention, is more than any vaunted article of cure.

In the human subject a hypodermic injection of morphia,  $\frac{1}{4}$  grain, under the skin, of the stomach after each action, is the best and only cure.

In the most hopeless cases it often closes the fatal flood gate, and saves the wasting life. Then the most easily digestible and stimulating diet restores nutrition and healthful functions are resumed.

But opium in any form, in my hands, has always been fatal to sick fowls. I feel that my recent experience in treating this affection may

be of general service and so I report two cases from among several, all of which were equally and entirely successful.

First case: A fine Buff Cochin Cock, two years old, beginning his moult in July, became stupid, ceased to notice his mating, stopped crowing, comb turned blue, would walk but a few yards and sit down, crop full of thick fluid (mucous from stomach irritation), trembled and looked frightened and would not eat. Bowels loose with yellow, frothy discharges at first, but soon became green and thin and soon milky, or like rice water with mucous, which indicates the albumen of the blood is passing out through the bowels together with mucous from lining membrane of bowels.

Well, surely here is what is termed a case of sporadic, or spontaneous cholera. This case originated in my yard from excessive heat, from debility of breeding, and from the exhaustion incident to moulting.

I could not afford to loose that Buff Cock as he was a \$50 bird. I put him apart in the shade on the blue grass; gave him oil cake, water, fresh and cool to drink, and then proceeded to medicate him as follows: took a cold biscuit, soaked it in sweet milk and worked it up soft; then added about the fourth of a teaspoonfull of ground black pepper, the same of flour sulphur, and a teaspoonful of ground oyster shell; mixed thoroughly and made into pills the size of pecans or peanuts and gave him one fourth of the biscuit by putting it down his throat; in two hours gave him another fourth, and so on, in six hours had given all and he improved from the first to get well. I fed him on wheat bread and milk for several days until his discharges became normal and he rapidly recovered.

Case second: My Plymouth Rock Cock, first pen was a noble essex specimen and taken the same as my buff, except that he became blind in one eye. I treated him the same, did nothing for the eye, and he, too, and several others since have all recovered from that treatment.

I have seen chickens ravenously swallow crushed china plate and recover at once from diarrhœa, hence the use of the oyster shell.

I think the flour of these shells would be also very good thus given in boluses of peppered and sulphured milk and bread.

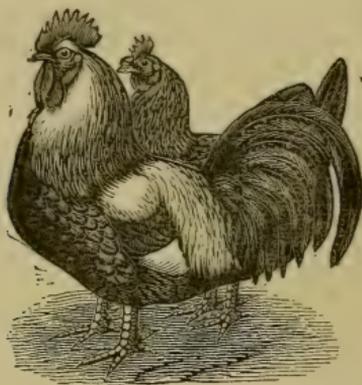
I have but little faith in the Douglas mixture, because, the fowl gets too much iron and too much acid.

It will be remembered by all physiologists that iron composes but

3 parts to the 1,000 of the blood, and is never indicated in the treatment of a human patient suffering with intestinal irritation. It does not digest and too often irritates.

Instead of the Douglas mixture, finely powdered iron added once or twice per week to the soft food in the proportion of 10 grains of Lactate or Carbonate of Iron to 10 pounds of food and 2 or 3 big spoonful of ground oyster shell and leave out the acid and your food will be much more rational and, I think, more healthful. If you do not care to combine these ingredients you will find "The American Poultry Food," made by C. J. Ward, Chicago, Ills., equally good.

Then to conclude on this subject, let me impress the vast importance of so feeding and cleaning and caring for your fowls that they may not get sick; but don't feed too much. A little, but often. Be especially careful from May until November, but especially during July and August for cholera, and for those fowls and chicks that are fledging the cold mornings and nights and hot days of autumn look out for Roup.



## CHAPTER X.

ROUP. WHAT IT IS. ITS RELATIVE AND REAL IMPORTANCE. ROUP DIVIDED INTO TWO STAGES, FIRST, THE SIMPLE CATARRH OR MUCOUS RATTLE, ITS CAUSE, MATURE AND SIGNIFICANCE. SECOND, ULCERATIVE CATARRH OR DIPHtheritic ROUP. ITS RESEMBLANCE TO DIPHTHERIA IN HUMAN FAMILY. ITS ORIGIN. ROUP DESCRIBED. TREATMENT.



WHILE cholera is more rapidly fatal than roup the latter is the more relentless and ruinous in the end and the most persistent of all poultry plagues.

Roup is an inflammation of the mucous lining membrane air of the passages which often pushes its presence into the cleft palate, the mouth and eyes. In its incipency, or at first, it is only a cold or catarrh, unless contracted from others by infection and then it assumes a specific and especially active and ulcerative aspect at once.

Roup, therefore, may truly be studied and treated as two distinct varieties. First; the simple catarrh, or mucus rattle that is characterised only by a slight odorless and clear mucus issue from the nose and which scarcely affects the appetite or general health of the chick. This variety may so remain for months, but usually recovers by good diet and dry, warm, clean quarters. It is usually the result of exposure to damp and chill weather, foul quarters and poor food,

Second: ulcerative catarrh, or Diphtheritic Roup is closely allied in all its essential characteristics to malignant diphtheria in the human subject. The origin, or causation is doubtless due to filth, insufficient or improper food and cold, wet roosting places, either, or all combined is cause sufficient to produce congestion and inflammation of the delicate membranes of the throat. The eyes begin to water, the nostrils are closed by tenacious glue like exudation, the bird breathes deep and difficult, the mucous collects in the windpipe

and all over the glottis, or opening into the air passage yellow ulcers and cheesy exudations are deposited causing the bird to cough and often ends in suffocation. The swelling extends from the nostrils upward and outward invading the orbit and swelling and closing the eyes, bursting and permanently blinding the fowl.

The worst forms of malignant roup seem prone to ulcerate everywhere about the head and throat until the whole presents a swollen, shapeless mass of indurated ulcers everywhere offensive and highly infectious. This form of roup is rarely ever completely cured. The putrid products of ulcerative supuration so easily finds its way to the lungs whence it enters the blood, that the whole bird is soon filled with the poison.

There is no disease more dreadful, none so unpleasant to treat, none so likely to propagate its like among all the other birds. If the bird survives the inflammatory ulcerations, if these be checked there is likely to follow a chronic catarrh, which at any time may rekindle from dampness and cold into a radical renewal of the first and worst features.

This disease like pneumonia, is peculiarly predisposed to relapse from the least exposure after a previous attack, because the damp and chilly air must be brought into actual contact with the now debilitated and sensitive surface, and so one season's acquaintance with roup permanently impresses itself on the memory.

It began once in my flock from little chicks being abandoned and exposed by the hens and soon spread among the fowls.

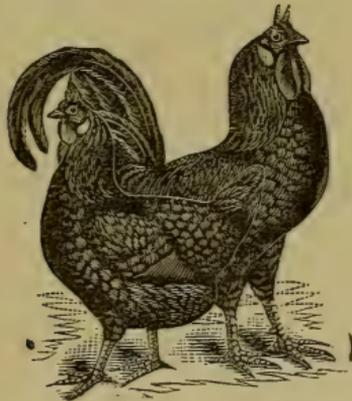
**Treatment:** Pen up every bird in large, dry, warm quarters. Whitewash daily with carbolized lime. Keep out all drafts of cold, damp air; feed hot bran, mashed potatoes and meat and medicate the throat and mouth and nostrils with chloride of sodium, or common salt as follows. Take a bucketful of warm salt water, put a teacup full of salt to that amount of water. Then catching the bird examine the throat and nostrils, removing all cheesy matter and pressing all mucus out of the nostrils, then filling a pint cup for each afflicted bird, hold it by the feet, with head down, choke it until the mouth is wide open and then insert the head into the solution, comb down, so that the medicated water may enter the cleft in the palate and go out at each nostril and into the throat. Every part of the affected surface may be thus immersed and all at once, and so easily that I am persuaded it is the best possible manner of applying the medicine.

Each should be separately treated, not all from the same cupful, but one cup will do for all.

Sulphate of zinc, with equal parts of chlorate of potassa, a half ounce of the mixture to a bucket of water ; or sulphate of copper, or nitrate of silver may be used about two drachms of each to the same amount of water, may each be tried in turn, but I have succeeded best with the salt water and carbolized whitewash.

Kerosine injected into the nostrils is said to cure ; and camphorated sweet oil so used is the one remedy relied upon by Mr. B. N. Pierce of Fancier's Gazette. But the best remedy, where the bird will score less than ninety points, is the hatchet. Kill every bird as fast as badly affected, treat the mild cases with energy and you will soon put an end to roup. But do not let it get a foothold in your yards, prevention is the best plan of treating all these dreadful diseases.

The one grand, golden idea to be practically put in operation among poultry and all other stock is this : Live yourself and treat everything under your care like a true christian. Keep scrupulously clean and care religiously for the comfort of all that is dependent upon you. Then others may have chicken cholera and roup but you are not at all likely to be so punished.



## CHAPTER XI.

GAPES. WHAT IT RESEMBLES. COMPARED TO CROUP, DANGEROUS FROM ITS LOCATION. DIFFICULT TO TREAT. HOW IT KILLS. THE ESSENCE OF THE DISEASE. ITS SYMPTOMS. HOW THE CHICKS DIE. WHEN THEY CONTRACT IT. HOW LONG PREDISPOSED TO IT. THE CONDITIONS THAT PREDISPOSE TO IT. HOW TO AVOID GAPES. THE MOULTING PERIODS IN THEIR RELATION TO DISEASE. HOW OFTEN CHICKS MOULT. HOW OFTEN FOWLS MOULT. PRACTICAL FACTS IN CONNECTION THEREWITH. REAL CAUSE OF GAPES. NO GAPES WHEN CHICKS ARE HATCHED AND REARED BY THE INCUBATOR PROCESS. WHAT GENERATES THE GAP-WORM? THE PECULIARITY OF GAPES AS TO LOCALITY. ITS RAVAGES IN SOME SECTIONS OF EUROPE. TREATMENT. THE POPULAR PLAN. ITS DIFFICULTIES. THE AUTHOR'S REMEDY AND HOW HE FOUND IT.



NE other formidable affection that often carries off whole flocks of little chicks deserves consideration in this connection. The Gapes. This disease, like membranous croup in little children, is difficult to treat and especially dangerous from this exclusive location. Both are located in the upper air passages and are rapidly fatal by way of nervous prostration and suffocation. But only in the manner of death and seat of the disease are the two affections at all alike. Both, however, tax the cleverest curative skill.

Our purpose in this place is with Gapes. The essence of the disease, or in technical terms, the pathology of gapes is the simplest possible and always the same, and consists of one or more small, red, round and crooked worms in the trachea, or windpipe, scarcely so large or long as a pin. These continually accumulate and by their presence provoke a constant gaping effort to admit more air and almost constant strangling cough or forceful wheezing efforts at expulsion. These labored efforts grow continually worse as the worms constantly

accumulate until the chick dies from utter exhaustion, or complete suffocation. Usually the chick is exempt from this affection until four weeks old; usually they contract it from five or ten weeks; after *three months old* I have never known one attacked. The period, then, when subject to this dreadful disorder, is from four to twelve weeks old; usually, if indeed, not always, this disease comes at the time when new feathers are beginning to come out and draw heavily upon the vital resources of the chick.

The gapes do not effect the chick before it begins to fledge, nor after it has on its first coat of feathers.

Thus, it will be observed that the period of moulting and the starting of the new plumage ushers in almost all the more dangerous forms of poultry disease. From this fact we draw the following practical lessons: First; Select for commercial poultry culture such variety of stock that feathers out earliest, hence less liable to the only disorders they will never be old enough to meet before they are marketed, which should be at three months old and before the second moult. Second; By observing the moulting periods of poultry and then giving them special feed and care we may always maintain a perfect immunity from these three worst of all other poultry ills, viz; Gapes, Roup and Cholera.

A chick, it will be remembered, moults twice before it is eight months old. It sheds its infant coat of dawn and receives its first coat of feathers at from three to nine weeks old. It then, if ever, suffers from gapes. It sheds this first coat of feathers at from six to eight months old then is liable, or predisposed to Roup and Cholera upon the slightest adverse influence which acts as an exciting cause. It wears the second coat of feathers one year, which finds the chick over one year old and, therefore, a fowl. It has its first annual moult as a fowl, at eighteen months old and then it is, especially, that the bird is liable to cholera, unless especially fed and cared for till the new annual plumage appears.

Fowls moult once annually. These are practical facts of vast importance to the poultryman, since it enables him to know the dreadful disease and the physical conditions that predispose to them and the seasons and kind of weather that acts as exciting causes. But, respecting the cause of gapes other than what has just been suggested, we must confess our utter ignorance. Corn meal dough fed freely to the chicks has been indicted for doing such mischief and there is

much evidence in the direction of conviction and yet, having recently tested the theory, I find that gapes are generated where no such diet is fed: but not so bad. To some extent we still suspect the diet of corn meal dough as causative.

I think *thus far*, no gapes have invaded the flocks of chicks that have been hatched and reared in an Incubator. Why? Because the brooder plan of caring for the chicks precludes the possibility of those exposures so notoriously incidental to the care and control of the old perambulating hen.

This suggests another fact. All the preventives yet devised for gapes that have proved successful consists in keeping chick confined in dry, healthy quarters, spading up the ground and giving varied diet, but the best of food. Thus adopting to that extent the scientific system. This done until the chick has fledged or feathered and all danger is passed. Why? Because, then, the debilitating influence is over and the covering of feathers keeps the chick's constitution from feeling the chilling winds and dampness. These facts that relate rather to *prevention* strongly suggest the cause to be any agency that tends to depress the vital force, such as foul weather and feed and the excitement and debility due to fledging.

Thus negatively, we may diagnose, or determine the cause of any difficulty, if only we may find the sure *prevention*, the *opposite* must certainly contain the cause. But, what generates the worm, especially of one kind and always in one place, and that in the air passage? This we do not definitely know and conjecture is fruitless in the absence of absolute proof; but, practically, we are pretty well armed against the gapes, since we can surely prevent them as above suggested, and, we can cure them by the simplest method.

Gapes seem *selective* in their visitation, attacking certain sections, exclusively, while others never know what they are, by sad experience.

In certain parts of Europe they are a terrible plague. I recently read of their inroads among the great poultry raisers of France, to destroy as high as 1,500 chicks and Pheasants in a single night.

Every possible remedy has been suggested to effectually reach and remove, or else destroy this nest of little spiral worms in the wind-pipe of the chick. Horse hairs looped and let down, twisted and drawn out is a popular plan, and feathers medicated and pushed down the pipe to persuade the worm out. "Tincture of camphor and pep-

per in the water," and on the feather, have been reported a success; but if any good old lady of either sex will let me see them take a chick pull forward its tongue and hold it there, even with assistance, then take a feather or doubled horse hair and go down harmlessly into the chicks windpipe, bring out all those worms and the chick gets well, then I will confess her surgical skill of the very highest possible order. I have always seen these experts fail and, like myself, they always succeed, in my presence in killing the chick.

Finally I found a remedy to reach and kill the worm. Being one night among my chicks that were all over the floor of the hen house coughing and gasping, I decided to try *carbolized sulphur*, as I knew from experience with it that one can easily fill the air with it, and that, I thought, must reach the worms and, if so, either the sulphur or carbolic acid must prove fatal and at the same time not harm the chick. So believing, I took several handfuls of sulphur into which fluid carbolic acid had been stirred in the proportion of one or two drachms to the ten pounds of sulphur and throwing it recklessly all over the chicks, I set up the most terrific cough and commotion, but every chick was better next day; and by repeating the next night, cured every chick of the gapes.

A better way of making the application would be to fill an insect powder box, containing a small bellows, which can be purchased at almost any drug store for fifty cents, and filling it with the carbolized sulphur, blow it directly into the air passages and so save 500 per cent. of your sulphur and do the work better.

The chick will rally in health and strength at once when it coughs up the dead worm, which will be inside of twenty-four hours.

Without intending to advocate the efficacy of sulphur for everything, it will be found to have a wide range of application in treating and preventing all those affections where insect or vermin, or parasite existence is supposed, or proved to play an essential part. Used as an ointment with carbolic acid it will readily cure scaled legs, because, there an insect life lies under the scales on the legs. So lice can be completely cleaned out with carbolized sulphur on anything, or fleas on dogs; but let me implore every person who reads these pages *never to grease anything that wears feathers*. It is unnecessary and it ruins feathers to grease them; besides, if you still adhere to the ancient hen system and attempt to set a hen with a partical of grease on her, the eggs will rot of course. Why? Because

the grease closes the pores and shuts out oxygen.

Often in the late fall months a flock of nearly grown chicks will break out with pustular eruptions all over the head, comb and wattels, sometimes so seriously as to destroy the comb. The pustules contain green, thick pus and are infectious. Open all the pustules and anoint the effected parts with carbolized sulphur ointment. Feed sulphur in bran or soft food and keep birds out of cold or wet weather. The disease is not serious, it is "*chicken pox*" or "*dry roup*;" indeed, we feel that when we have thoroughly mastered the situation, have a perfectly intelligent understanding of the seasons when the three most formidable of all poultry diseases appear and the condition of the fowls or chick's physical system at those particular times, which so thoroughly predispose them to those ills, and when thus enlightened as to the cause, and can both prevent and cure *Gapes*, *Roup*, and *Cholera*, we have very little else to fear from those other lesser ills and ailments that never rise to the dignity of epidemic disease among a flock of chicks or fowls, and, so our present purpose is only to point out those *formidable affections* that would be likely to wreck the enterprise of extensive poultry culture and so, in this connection, have not thought it necessary to go beyond the consideration of the great Trinity of poultry trouble, which are *Gapes*, *Roup* and *Cholera*.

Of course, these do not cover the whole of poultry diseases; but diarrhoea and canker are so nearly identical with cholera and roup that a similar treatment will generally suffice.

Bound crop had better be opened early, at the top, the contents cleaned out with the finger boldly and the inch or two of opening sewed up by passing three or four stitches deep through the skin and muscle of the crop, and feed the bird soft food for ten days in confinement and then cut out the stitches.

## CHAPTER XII.

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A POULTRY FARM DIVISION INTO THREE DEPARTMENTS. FIRST, A POULTRY FARM FOR EGGS. SECOND, A POULTRY FARM FOR STANDARD FOWLS. THIRD, A POULTRY FARM FOR MARKET POULTRY. MATING FOWLS. MATING FOWLS FOR FERTILE EGGS AND VIGOROUS, HEALTHY CHICKS FOR VARIOUS PURPOSES. ASIATIC MALE BIRDS UNFIT FOR COMMERCIAL POULTRY CULTURE. ASIATIC FEMALES THE ONLY KIND SUITABLE. REASONS WHY. DIVISIONS OF RUNS, HOUSES AND GROUNDS FOR 500 HENS. HOW DIVIDED. HOW TO BE HONEST WITH AN INCUBATOR BY RAISING YOUR OWN EGGS. HOW TO MATE FOR EXHIBITION. HOW TO FIX FOR SHOWS. THE INFLUENCE OF SPECIAL FEED. HOW TO CHECK OVULATION IN HENS.

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E now come to the more congenial care and management of a Poultry Farm, and, we confess, our special pleasure in the elaboration of this fruitful theme. There are three separate and distinct departments of poultry culture that admit of coming under the caption of a poultry farm, namely; 1st., a poultry farm for eggs, 2nd., a poultry farm for breeding market chicks, and 3rd., one for cultivating strictly standard or thoroughbred exhibition and breeding birds. Which of these afford the greatest profit must relate very largely to place and circumstance. For instance, the breeding of broilers, or young chicks for early market would be barred by bad market, or if the location was so far from a large and populous city that transportation of chicks would be impracticable, would, of course, suggest one of the other departments such as eggs or blooded fowls, which may be safely sent any distance.

We shall say but little in this work of the egg farm, because we are conducting some valuable experiments, and because the original purpose of the present volume embraced only Standard and Commercial Poultry Culture by artificial process. We shall shortly

issue a manual on the "*Egg Farm*," which, we think, will prove especially serviceable.

We now propose, first a few suggestions of the practical operations of Commercial Poultry Culture by artificial process. To this end we insist on assigning to the hen her only proper and profitable function, that of furnishing fresh and fertile eggs in the greatest possible quantity and state of perfection. And let us for these reasons look carefully into this matter and be sure that our stock and matings are such as shall insure us the largest number of finest fertile eggs from large, vigorous stock. The reason assigned for all such precision and particularity in detail are fully set fourth in the preceeding pages and need not be repeated here,

We now confront a very important consideration of this question of poultry culture and one which must always practically affect the issue of all our operations. I mean the scientific mating and management and proper varieties of fowls for fertile eggs and vigorous beautiful chicks.

For market purposes a judicious cross of pure bred varieties has proved much the most successful, because we thereby secure the benefit of new blood and avoid that of continual inbreeding which, to some extent, retards in time, the growth and size and value both of chicks and eggs.

The thorough-bred asiatic males are disqualified for purposes of commercial poultry culture by reason of the vigorous duties imposed upon the breeding birds and, as six or eight females are the most that can be mated with an asiatic male bird, the question of *house room* and *runs* become an item for consideration.

The greatest possible number of hens to each harem will greatly assist in economizing space ; and such males must be selected as can best accomodate the largest number. To this end the male bird becomes an important factor. He must be large and vigorous and and very active and yet fully matured. These qualities are absolutely necessary in the male, that he may fertilize the eggs and impart his size and stamina to the chicks.

It, therefore, becomes evident that the asiatic male bird must be barred by the essential conditions for such mating.

But, if, for this cause we cannot employ the asiatic male, neither can we for equally good reasons employ the hens from the smaller varieties, because the size and rapid growth of the chicks are points

of vital importance, in view of the vast quantities of food several thousand chicks will daily consume. We, therefore, from the very nature of the case, cannot employ the smaller females for want of size.

With these facts before us, we are forced to select that variety of females that combine in fullest measure the very important qualities of size, vigor and egg prolificness. We care nothing, whatever, about the hen's *action*, since she is assigned to no service that will call such qualities into action ; but we must have perfect action in the male bird and, of course, the greatest size consistent with that essential quality.

Again, it is of first importance that these birds be bred from the best laying strains, and chicks will always sell better that are all alike in size and color.

To meet all these essentials including size, vigor, action and egg prolificness in the fowls, and hardihood, uniform color and large early maturity in the chicks, we recommend the following mating as most beautiful and vigorous and, therefore, best.

First: Fifteen large, early hatched Buff or Partridge Cochin pullets mated with a large and vigorous Brown Leghorn yearling cock.

We will insure this mating to produce large, brown, beautiful *Yellow legged chicks* that cannot be equalled for vigor and that will weigh two and one-half pounds each, at ninety days old.

These Buff, or Partridge Cochin pullets will each lay eighty eggs from November first, to the middle of April, a little over five months ; and such a male, if rightly fed, will fertilize almost every egg.

The male bird might be better if half Buff cochin and half Brown Leghorn ; but he must have the best of action.

Another mating equally good is the following :

Second: Fifteen early hatched Light Brahma pullets and one large, high grade, rose-comb White Leghorn cock one year old.

These two matings, we believe, all things considered must prove the very best possible for purposes of commercial poultry culture.

These fowls thus mated should be quartered on dry, gravelly, rich soil, well drained and set in shade trees and clover in summer and rye in winter.

Five hundred hens thus mated should have five acres of pasture to

do perfectly well. This should be surrounded with a tight, high and strong barbed wire fence and so divided that roads would admit a wagon or cart to come all through the quarters to convey feed and haul away manure, etc. The houses should be built in rows behind each other with the largest possible space between, for pasture.

In five acres there are 13,200 square feet and 500 hens, divided into pens of 15 each, give 33 pens, say 35 as two extra could be used for broody hens. The 5 acres divided into 35 pens would give to each pen about 377 sq. feet, including houses and roads, or about 15 or 20 feet to each bird. The houses can be made of upright pine boards very knotty and rough, lined and covered by thick tared felt, six feet high in front, four in rear, roof one way pitched and graveled; house 10 x 20 feet, cement floor.

The original cost can be better calculated by each for himself, as land and labor and lumber vary in price in every locality.

These quarters, if not warm enough in winter, can be made so by the use of the box brooder under the floor heated by coal oil lamps, or better still, by glass in the roof; the building lined will make the house very warm.

Once thus fixed, eggs can be relied upon from November to July, through the coldest of weather, and such eggs will give infinitely better satisfaction, better hatches and better chicks than any other possible source. Do not depend on anybody else for eggs.

These hens should be all changed at the fall moult, fattened and dressed for market before they moult, and replaced by pullets that were hatched from the same stock, new male birds annually introduced, and so the greatest of all difficulties that the artificial system of poultry culture ever encountered may be thus completely overcome.

The practical necessity will be seen to be a reliable supply of perfectly fresh and fertile eggs that are not shaken, nor chilled and from stock that are full of health and vigor, of large size and early to mature. Such a test never failed, and such is the only way to be honest with an Incubator.

Will any sane man doubt that this can be carried out and will any honest man decry the Incubator, when such essential conditions are not complied with. Of course, the latitude that we have all allowed the general plans and specifications as herein sketched for yards and buildings, are not at all arbitrary or unalterable.

The purpose on which we insist is to provide ample, cheap and comfortable accommodations for a vast flock of fowls and secure the necessary quantity and quality of eggs.

These fowls are all young and not easily fattened, but demand to be fed on the scientific principles suggested in our article on food. Remember the condition we require in these breeding birds is the fleshy and muscular, the fibrous and not the fatty condition.

Feed for vigorous health and thus for eggs.

After these birds have been bred from October or November, until the following June, thus covering the season when broilers, or market poultry pay the largest, it becomes necessary to remove and market them all for the several following good reasons.

First: They will not lay as lavishly the second year as they did the first, because they will have attained full growth and development and, hence the full feed that is required to force the largest egg yield from early pullets would fatten hens and induce them to set.

Second: As we have seen in our article on the predisposition to disease, there is scarcely any danger so long as fowls are in full feather, but so soon as they begin to moult, the loss of feathers allows of loss of vital heat and the further drain upon the system from the starting new plumage and the oppressive heat by day, and the cool nights of autumn, contribute to cholera and roup.

Third: A thorough cleansing, whitewashing and disinfecting of all the quarters through August and September are essential to maintain for the succeeding year the most perfect condition of health upon a poultry farm.

It therefore, becomes an important and necessary part of the general management to stop incubation in May and fatten the fowls in June, market and clean up and prepare for early fall.

We thus get the best prices for chicks and the fowls will pay their first cost. We get the greatest possible number of eggs within any period of a pullet's life the first five or six months of her laying. We avoid the cholera, we keep everything scrupulously clean and we get our fowls fat and marketed before they moult.

These fat hens, correctly cleaned and packed and consigned to any first class establishment in New York will command a ready sale at from 10 to 18 cents per pound.

So much for eggs and stock.

Everything, of course, depends upon that, and unless thus organized, no persons can provide them for you at any price.

By the arrangement here outlined, your cost all comes back to you in the annual sale of fat fowls, the best of eggs and stock secured and after the original outlay everything in the form of cost and care are reduced to the lowest possible point at which any large and lucrative enterprise can be successfully prosecuted. But suppose we do not care to breed for market, but our purpose is to furnish the finest, standard breeding and exhibition stock, wherein does all this outlay essentially differ in the prosecution of the two departments of poultry culture. We answer, mainly in the mating.

Whatever variety of standard stock be thus confined the male bird should not be allotted over five to eight hens, first, because the large breeds will better fertilize the eggs of a few hens and, again, the fewer in each flock, the longer the pasture will last and the less liable to disease.

Again, five asiatic females will lay 400 eggs during the breeding season and, if only these five be assigned to the care of one vigorous cockeral, experience and science assures us, that the eggs are much better fertilized and the vigor imparted to the chicks is soon made manifest in their superior size, strength and early development. What is most essential above all in this fine blooded stock is *color, vigor, symmetry and full size and development*. Therefore, in order to insure the most perfect reproduction of the breeding birds, do not draw too heavily upon his vital resources by giving him too many hens.

Fanciers, or standard poultrymen remember, do not breed so much for *quantity* as for *quality*. Since superior excellence of standard merit determines the price upon what their yards produce. For example, a vigorous asiatic male bird that will honestly score 96 points will readily sell in England or America for \$100, while 10 birds that would score only six points less would not bring the same money.

Quality, then, is the essential consideration with the fancier, and high quality can never come from even the best standard specimens if overmated. I trust this point will stand impressed, because it has much to do in determining the vigor, the beauty and highest scoring qualities of pure bred poultry as well as everything else.

Such high priced and rare standard stock as would justify the cost and exclusive care of the standard breeder must often be kept and continued in breeding and cross breeding and so the same yards must be always occupied, and for this reason, also, the number should be as small as possible ; thus, the same general plans of poultry houses and grounds will serve equally well, both for the occupancy of market and standard mating.

Nor shall the diet be different, since in both cases the condition of the two classes must be kept in the finest possible plight for egg production.

With so much room thus assigned to six or eight high class birds we are in condition to *relieve the cock* and separate him from further company and contact with the hens when the moulting period appears, and the sale and incubation of high priced eggs are no longer allowed. Then, of right, the breeding stock should rest, and ovulation be no longer allowed, because the fruit of these functions are worse than wasted, and should be reserved for such time as they shall again command the fancier's price in the revival of trade in the coming spring. Besides this, the birds should be *shaped for the shows*, for there the breeder must bring the merits of his stock to that truest test which, if successful, makes his market. The cocks then, should be partitioned from the harem and all more fully fed and filled out plump, especially up to something over standard weight making allowance for loss of flesh while shipping and showing.

The faults of symmetry must now be filled with fat, the oil that lends lustre to the plumage is, also, thus secured and the plump and perfect, full and faultless form of the grandest, sleek and splendid specimens of exhibition stock largely rely on the service of sufficient fat to insure, at least, the finest possible condition. Well, how shall this be rightly done ? We answer by checking ovulation in the hens and relieving the cock from duty in the harem and by generous diet such as combine the fat elements as formulated in our table. Wheat and oil cake meal especially beautify the plumage of Buff Cochins and *buckwheat*, says Mr. Wright, is especially adapted for the fitting up of the Partridge Cochin for exhibition.

Now, whether the true philosophy of the good effect of such diet be in the deposit of the coloring matter peculiar to these cereals, or whether it be from the elegance of such diet, as science and experience have found that they afford, or both, we are not positively

assured ; but, physiological experiments have shown that pigs fed on *madder alternately*, off and on for several weeks, revealed the alternate red and white colors in the laminae of their bones, from the deposit of the red coloring of the madder. Sulphur, too, imparts its coloring principle when fed in food ; but oil cake meal possesses the universal quality of imparting an oily gloss to the hair and plumage when fed with bran and shorts and crushed corn and oats steamed and fed warm.

The present purpose is only suggestive ; but, surely, certain select and elegant articles of diet do impart a peculiarly grand, gaudy plumage to fowls.

But how shall we check the function of ovulation in our laying hens ? We answer by breaking up their relations and changing their quarters.

Cows are also very sensitive in this respect. I once purchased from Mr. Felch and shipped from Natick, Mass., to Illinois some 40 Jersey cows. They all received the best of care enroute and ever after ; but, though many were fresh and others became so soon after the trip, yet, not until the next coming-in did we learn the full value of these glorious little fawn milkers.

Hens will often cease laying at once on shifting them into new quarters and if often so disturbed, hens and pullets may be kept from laying almost completely. They never look so fine as just before laying.

Since we are now considering for awhile the so-called Fancy Fowl ; but, if you will allow me to say with more propriety, *the pure bred fowl*, we would respectfully suggest that much greater success must come from the culture of large numbers of one variety than a few each of a great many varieties. Why ? Because each is essentially different from all the rest in form and feathers. For instance, the high cushion and broad low blocky build of the Buff Cochin would be radically wrong to keep as an ideal in the mind in mating your Light Brahmas and again, either of these varieties can not be fed as freely as the Leghorn or Plymouth Rock for the reason that they would soon take on excessive fat and so be utterly broken down before the end of the season's breeding. A natural partiality for some particular variety of pure blooded poultry will soon suggest to each the particular variety he can best breed up to the highest perfection. The demand is infinite for all varieties that are truly fine.

No living poultryman ever admired intelligently every standard variety, and for that reason and endless others, would not and could not master the standard requisites to its correct cultivation.

The endless diversity involved in the study of ten or twelve varieties would confuse, confound and utterly destroy that able accuracy in the delicate details of developement so essential to the success in all.

No breeder can succeed unless he studies the standard, assisted by delineations from the best artists and then bring the bird you would select as your breeder for perfect symmetry into the presence of this crucial *comparative test*.

Thus equipped we go to the best exhibitions and there bring our own and other birds in critical comparison with each other, and with the true standard delineation. Possibly our bird is too low in back, or flat in breast, or otherwise so strikinly defective that we are amazed how much the standard comparison has pointed out. Otherwise we were uninformed, and so unfit to go forward and must fail if we do, thus uneducated.



## CHAPTER XIII.

THE PRINCIPLES OF STANDARD POULTRY CULTURE, CONTINUED. THE ESSENTIALS OF A SUCCESSFUL POULTRYMAN. HOW TO BREED FROM DISQUALIFIED BIRDS. ORIGIN OF THE IDEA IN AMERICA. THE INFLUENCE OF THE MALE BIRD ON THE PROGENY, HIS GREATER PREPOTENCY ON ACCOUNT OF HIS GREATER VIGOR. HOW TO MATE FOR CORRECT LEG AND FOOT FEATHERING. HOW BEST TO SECURE THE SIZE. WHY THE MALE BIRD IS MORE PREPOTENT. DR. STONEBRAKER'S PHILOSOPHY ABOUT THE PROPER AGE FOR BREEDING BIRDS. REASONS IN SUPPORT OF HIS VIEWS. IN-BREEDING. ITS NECESSITY IF CONTAMINATION OF BLOOD CAN COME FROM COPULATION. THE QUESTION ARGUED AND THE RESULT PROVED INCORRECT. THE ONLY POSSIBLE MEDIUM FOR CONTAMINATION OF THE FEMALE IS THROUGH THE MEDIUM OF THE MIND. INBREEDING EXPLAINED, ADVOCATED WITHIN CERTAIN SAFE LIMITS. A PEDIGREE FOR FURE BRED FOWLS A NECESSITY.



HUS the principles of poultry culture must, of necessity, be studied like all other sciences, if we succeed. By such a process of direct and *comparative study* of each variety we breed, we become expert and deeply interested, and such a qualification is absolutely essential to successful standard poultry culture. In this, as in everything else, brain must be in the business. "There is no excellence without great labor." No natural born poultrymen. He may be *inclined* in a given direction by special talents and taste, but there is absolutely no self-sufficiency of genius in anything. Education, hard, patient and persistent labor is the life and soul of all true excellence. Poultry culture is no exception we assure you, and all who embark in the business as a profession must first of all understand the necessity of this natural and educational qualification. Do not be ashamed of the business as a *Poultryman*, for success demands that all shall be proud of it,

Thus impressed and prepared for their comfort, then buy the *best fowls* that can be found. If only two or three, *breed these* and continue to buy the best and never let a few dollars deter you from mating up the best living birds. The most perfect is none too good to breed, since the closest approximation to perfection in the parent stock will, from necessity, under the laws of inheritance, that, like produces like, give very much better standard specimens than cheaper and far inferior fowls. It is a sad mistake to suppose that from poor or even pretty good stock, the higher and splendid standard specimens may *possibly be produced*.

A stream can not rise higher than its fountain sources, and be assured, that the same natural laws hold dominion over the mightiest and minutest details of hereditary descent as faithfully as they do in the domain of gravitation.

But all can not buy these best specimens, since there are but comparatively few, and these command the heaviest prices. How then shall they be secured? How can they be bred? We answer, first, breed directly from the most perfect specimens as before suggested. This any one may do who has good judgement and a bank account to his credit, but to breed these best specimens from "*disqualified birds*," requires great skill and scientific experience and, yet, such is the source of every thorough bred bird. I mean, to trace him back to his ancestry, he is indebted to that scientific device for all the standard excellencies to which he has attained. The origin of this idea is altogether unknown to me; (we find in Mr. Wright's large work,) but to Mr. I. K. Felch, of Massachusetts, must be accorded the credit of giving it form and features and filling it with practical life among American fanciers. Especially in fixing the color, this eminent poultryman has demonstrated the greater prepotency to be in the male birds, and thus mating the deep colored males to the lighter females he attains to a standard mean in the progeny that is much superior to either parent. But I think that he will allow exceptions to this greater prepotency in the male, for, in fact, it often occurs that the female even in color, imparts to the progeny her greater influence in fixing the correct color, and so Mr. Felch affirms, we think, in his second best matings of Light Brahmas. But the preponderate influence we think, belongs with the male as we find the dark male to give deeper dye to all the offspring more uniformly. We do not know that that theory is

affirmed further than the mating of the Light Brahma ; but our own experience remarks it running among all varieties.

A Buff Cochin male, bred to Partridge Cochin pullets will put the buff color on the chicks and breed out the striped feathers in three matings. A Plymouth Rock male bred to Brahmas will mark all chicks after himself. The male, in general, has that prepotency as to color.

Again, the sex is largely males in early spring clutches, while the vigorous male is not reduced by over duty, while in feeble cocks, or much depressed by the season's service, the latter progeny are more largely pullets.

We think, however, this question of imparting the greater degree of personal influence in fixing the color and other characteristics peculiar to either parent depends, in largest part, *on the vital vigor* of the one or the other. It, therefore, may be in favor of either, but, on account of this fact, the rule favors the male bird, he being as a rule, more vigorous.

In mating for correct leg or foot feathering we have made long and careful observation and found it unsafe to breed a male Cochin with stiff, heavy hocks even to very sparsely feathered hens ; but some of the finest hocks we ever saw were secured from vultured pullets and light-feathered, vigorous cocks. But the experiment must not be repeated with these improved progeny, but made permanent by observing the law of the first and best mating which calls for special best selection. This special selection embraces both the best mating, that is, the most perfect, and, also, the second principle, which must seek such specimens as shall secure the best mean or compromise between the imperfect pair.

To illustrate. If we mate a Buff Cochin pair, full, in breast, and body, broad in back, high full cushion, full round soft hocks and heavy foot feathering, even rich deep under and outer color, small even combs pure buff wings and standard tails we should expect elegant offspring from such a source, for such birds are very high in standard excellence, such would be the best possible mating.

Again, if we select just such a male but very heavily hocked, with stiff quills protruding down and backward from the hock joint you dare not mate him at all, even though the female be barren of middle toe feathering and light in hock; but, if the female be immensely

feathered, even approaching the vulture, and the cock be vigorous and sparsely feathered, the progeny will many of them be finely feathered. Thus, the principle all through proves the prevailing greater power of the male bird to impart his special features and, I will add, also his *form upon the flock*. The size of the chick, we think, may be most easily secured from the hen, since it is almost impossible to breed a very large male bird successfully, and *entirely* so, to small hens.

The one idea we would impress is, if we try to get a standard balance or midway point of merit, or, if you please, an average mean between two birds that are out in different directions in the same section, or part, then expect the male bird to have the greater modifying influence since he imparts the vital principle that moulds all the matter of the mother egg largely in his own image.

Thus we rest from further pursuit of the principles of mating, claiming nothing original but the reason why the male bird hath the greater prepotency of power to impart to the progeny his own peculiarities of color, form and feature.

The fact is founded in this; that the male bird is the more vigorous, and that he imparts the vital principle and governing force.

These two matings, we think, are all-sufficient for all professional poultrymen who cull their chicks carefully and closely, and the principle will be found to apply universally and to all varieties. With the interminable train of petty details we have nothing to do, since the principle will explain what is wise to accept or reject in any and all instances of mating.

Another all-important principle suggests itself at this point and one which my distinguished and learned friend, the late Dr. Stonebreaker, of Waco, Texas, insisted upon with his usual earnest accuracy and great ability. Reference is made to the full maturity of all breeding birds.

In a series of excellent articles in several poultry periodicals just before his death he detailed the experimental facts in support of his theory and did much to dissipate the almost universal practice of breeding from pullets and cockerels, instead of yearling and two year old stock. An impartial consideration of this question warrants the conclusion that no standard bird should be bred under eight months old. Doubtless, if allowed, the precocious thoroughbred will begin to crow and cackle to mate and multiply and reproduce their

species at a much earlier age, in fact, a friend of mine set a Buff Cochin pullet, hatched in January, upon her own eggs and she hatched a fine brood the 23rd of August of the same year. Leghorns and Plymouth Rocks lay even earlier, but these precocious pullets and cockerels should be kept separate and not allowed to ovulate, by often shifting them into new quarters and so allowing them to continue their full growth and development on to maturity.

The whole argument in susport of Dr. Stonebreaker's theory is deduced from the physiological fact that nature's operation can not be contravened and yet contine perfectly on to the end and give the best possible issue. If nature requires at least one year to fully develop a bird its vital resources should not be diverted, or drawn upon during that process.

We think the axiom self-evident, that nature cannot hold on and let go at the same time, and, if her resources are directed to the developement of a bird and meanwhile, those resources be arrested by a counter call diverting the vital influence in the work of generating the species of the parent bird, the breeding bird must suffer from arrested developement, and stunned in every sense, and the progeny from such source must, from necessity, be imperfect and deficient in vigor.

Therefore, in breeding standard specimens, the purpose being to attain as nearly as possible to perfection in every sense, the full maturity of either one bird or both, is certainly advisable.

It will readily occur to all as difficult to determine, without positive and careful experiments, the relative result in breeding from mature and immature yards; but the intelligent and patient observations of Dr. S—, enabled him to say as a fact of his experience, that chicks bred from pullets and cockerels were vastly less vigorous than were the chicks from specimens over one and under three years old.

We have thought the subject worthy of introduction and believe all will be benefitted and appreciate the scientific and practical suggestions inseparably associated with this subject. It is only right and proper for us to go upon record and we cheerfully re-affirm and defend the faith of our lamented friend.

Cockerels and pullets 8 or 10 months old crossed with cocks and hens are probably old enough,

The early hatched chicks, say of January, February, March and April, but not later than May, are suitable to associate with hens of

the previous year, or even three year old hens, when they themselves are one year old. We believe the two year old cock the best age for breeding males for standard specimens.

Inbreeding demands some certain and reliable assertion either against the practice or in its support according as science and experience have established the truth. What are the facts? *Inbreeding is a necessity* if it be true, as some assert, that the first sexual congress and conception impresses indelibly the features or influence of the male upon the female forever; for surely those hidden influences would harrass all our operations and, being completely covert, would everywhere confront and confound all accuracy of calculation.

Every effort at introducing new blood would prove utterly impotent against the previous impression, or, if the virgin specimen be thus first impressed by this outside or alien element, then we should start off at a tangent under the auspices of a new influence never to be able to return.

It is, therefore, well thus to make the issue and remark the utter antagonism of inbreeding and introducing new blood, if it be true that contamination of blood in a bird, can come from copulation. Inbreeding, in that event, must be our only security, since no mortal ken could know the lurking love that is stamped upon the plastic soul and insured to all the future offspring its own unending image.

But are we forced to inbreeding from such a fallacy? And is this asserted contamination a fallacy or a fact. We answer in the name of science it is not only false, but it is not even respectable nonsense. What is the scientific fact? All animal existence are propagated through ovulation and sexual vitatization. In the case of all mammals the egg is evolved from the female ovary, just the same as in the fowl and further, it is vitalized by copulation just the same in all instances; but in the animal the egg thus vitalized finds its lodgment in the maternal womb and there, though the vital circulation is indirect, though the growth and development of the fœtus are affected under the auspices of osmosis or the passage back and forth, that is, to and from the fœtus through intervening membranes, still the maternal brain and blood presides over all and propells all the processes of intra-uterine life. Though the child or animal in the womb does give back to the mother's blood the waste material of its own body, yet this debræ is dead and is cast out and can not, in the

nature of things, contaminate the mother. In order to possibly produce such impression it must be living fluid and so enter her circulation and contribute to cell-construction, or the atomic rebuilding of her body. Then, and then only, could the father ingraft himself upon the mother through the little life within the womb. The fact is that, the father cannot thus contaminate the mother with the most malignant disease. The off-spring will suffer, but the mother escape. Why? Because what the mother imparts to the child is imbued with life, but what it gives back is dead matter and incapable of harm to her.

The father, then, cannot contaminate the mammal mother through the medium of intra-uterine life. What, then, may be expected of the fowl? Like the animal, the egg is evolved from the ovary, it enters the oviduct and somewhere in its passage to the outer world it is met and vitalized by the electric life principle of the male. It continues on, receives its casement or shell and comes forth containing the essential germ which, subjected to the same conditions that the animal egg receives in the womb, which is heat and moisture, it germinates and grows into vigorous life. But the fowl's egg never germinates within the fowl and so never gives back anything whatever to the mother, but receives the male influence, seals it in a shell and, egg and influence and all are expelled together. Thus the egg receives the vital influence of the male, but never touches nor tarnishes the circulation, nor the physical system of the hen and so contamination of the blood by copulation is a physiological absurdity. It is contrary to life's processes. The influence of the male will reach only those egg that are evolved in and thrown off from the ovary and are in the oviduct all ripe and ready for the reception of the vital influence; but beyond these the male influence is actually impotent and inoperative by way of copulation, or sexual contact.

Such is the dictum of physiological science on the subject and from which we see that the only possible source left for those permanent impressions to forever influence the breeding of an animal or hen must be through mental media, which we are willing to concede under exceptional circumstances, of strong attachment and highly developed and sensitive mental organization, but we can scarcely credit the existance of this deathless devotion, this permanent impression, this heavenly endowment in a hen. And so we are not forced to practice inbreeding from fear of contaminating any

particular species upon which we admit a cross. The success of the cross, of course, is another thing.

What are the evils of inbreeding? Does it depress the vital forces? To some extent we think it does. But we think the danger in this direction is unduly magnified. When inbreeding is practiced and pushed to produce the pure blooded racehorse with his perfect symmetry and iron constitution and staying qualities. When we practice inbreeding between the parents and progeny of cattle for purpose of perpetuating especial merits of milk and butter and beef, all of which depends upon strong constitutional capacity, we doubt that the dangers of judicious inbreeding for three or four generations are worse or half so fatal as the folly of annually introducing new blood.

When we see a strain of fowls breed for 25 years from one line of males and refreshed from without only at long intervals and, then through the females, and thus continue to enjoy the highest reputation and merit for elegance in everything, we are convinced that inbreeding is the only safety from going to pieces and destroying any strain, especially in color and excellent qualities.

Of course, continual inbreeding dwarfs and degenerates and, therefore, is wrong, but when the purpose is to reproduce identity of type in everything as in pure bred stock, the only possible process by which it can be done is to breed in and in judiciously, introducing new females every three or four years of the finest possible merit, and as much as possible, like the strain in cultivation. Select the new blood only, from the finest standard specimens, of the best strains in existence, and then for years again go forward inbreeding from the best standard specimens of what we have, that is nearest the desired type to which we aim to attain, and so is brought about the different forms and features of the same variety of fowls and so is secured the best possible result that come from any system of standard or pure bred poultry culture.

But do not write for "fowls that are no akin." You will certainly hazard a chance of securing a start in the strain you desire. No one can tell the result of a cross, and a cross is what is ordered when your injunction to the breeder is that, "the birds shall be no akin." We think it only necessary to thus suggest the point, and offer the principle, to make the truth apparent that, so many changes as must come from the annual introduction of new blood could not but ruin

the best result. Nature without a miracle must refuse to blend such constant, strange and incongruous elements as are hidden in each new and, to some extent, improper pair, into one ideal and symmetrical whole. Remember, therefore, that while perpetual inbreeding is not to be practiced, nor, is it here advised, still the greater danger comes from so-called new blood; and, that all thorough or pure bred stock result from inbreeding.

Again, a pedigree for standard fowls is an imperative necessity, because it brings our operations into systematic accuracy and enables us to know the actual breeding value of every male bird especially. Otherwise everything is guess work and must go wrong.

The females of every pedigreed pen should be carefully studied as they begin to lay and soon the intelligent observer may readily recognize the egg of each particular hen.

The eggs should be stamped at the nest and when about to hatch a separate drawer assigned them in the Incubator and the chicks specially marked and recorded as hatched. If extra care be urged against the pedigree system, the counter fact is clear that, better prices will be paid for what you can recommend and sell with satisfaction to yourself and to your patrons.

In either, market or pure bred poultry culture, honesty is always the best policy. We know of one instance where a pen of poor birds were sold and shipped west where expectation was high and the whole population had assembled to see the fine fowls, but when they came they were poor specimens and the disappointment and disgust were universal and did the breeder infinite injury. So our transatlantic breeders have filled several orders for Buff Cochins that would be disqualified at any first class show in America, and so American breeders are afraid to further hazard the enormous cost and bad importation. We would pay the price with pleasure if we could depend upon securing their finest specimens and this feeling is universal and is here suggested as the source of greatest injury to the commerce in fine fowls.

There cannot possibly arise anything so ruinous to trade as loss of confidence, and, the trade in fine fowls rests exclusively on confidence and when its sacredness is outraged by receiving a bad specimen, both confidence and further commerce are killed. Thus all intelligent poultrymen should see that violating the confidence of a patron re-acts upon and ruins his own reputation and business.

The commerce in market fowls and chicks is differently conducted as the stock is inspected before paid for, in most cases, and consignments are continually made to one firm and must be found satisfactory.

From all the foregoing what shall we conclude? Does poultry culture pay? If rightly conducted it does beyond the universal belief.

And which department yields the greater profit? Which ever you prefer; both yield the largest returns for care and capital invested of any other known industry and the encouraging feature is the demand is constantly increasing.

The food supply cannot be surfeited. If a few fowls pay well, enlarged numbers pay equally well, if rightly managed.

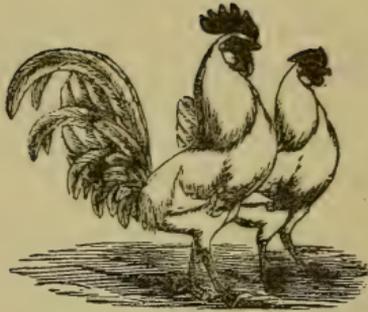
Like every productive industry this must pay near populous sections and cities where markets absorb such food supplies. There, astonishing prices are paid for tender broilers from December until May and June. Often 50 or 70 cents per pound for chicks that weigh from two to three pounds, fat and fine. These can be furnished by the Incubator and brooder system at any time and in any quantity when once prepared. Preparation and expense must be incurred in every occupation; in this we are not utterly dependent on the action of the elements as in agriculture. Whether it rains, or not the poultryman is equally indifferent. His operations go on under cover controlled by agencies of which he is master; and man must eat and so his supplies must sell. Unlike the professions, or merchandise, or agriculture, or all the vast and varied avocations with which the human family have become more familiar. Poultry culture is not so subject to contingencies. It isn't overdone. There is a demand for it and the demand is almost infinite. The new South and California, because of the mildness of their climate, are especially suited for this commerce. Disease has been the dread, but on this we trust these pages will prove that once free from vermin and epidemic ills, and with the facilities afforded by modern invention, poultry culture cannot fail to engage the business brain, the active energies, and even the enthusiasm of the American producer.

A gentleman recently assured me he realized a net profit of \$7.00 each from 300 hens. Another instance, he raised 3,000 ducks by the Incubator process, which weigh  $3\frac{1}{2}$  pounds at ten weeks old and for

which he realizes forty cents, live weight.

Regulated as prescribed in this publication, mated and managed as herein advised an early Asiatic pullet affording from 70 to 90 eggs in six months must average from 20 to 25 chicks and these selling at from 40 to 70 cents per pound and costing 5 cents per pound must afford a net yield of over \$10 per hen.

A poultry farm of 8 to ten acres, with 500 or 1,000 hens, carefully managed near some populous city cannot yield less than \$5,000 or \$8,000, net annual profit.



## CHAPTER XIV.

THE DIFFICULTIES THAT THIS INDUSTRY HAS TO OVERCOME. THE GREATEST OF ALL IS PREJUDICE. THE REASON. THE AUTHOR AND FARMER. COMPARING NOTES. RELATIVE PROFITS FROM POULTRY AND AGRICULTURE WITH EQUAL CAPITAL. THE RESULT ATTAINED BY POULTRY MEN IN DIFFERENT PARTS OF THE UNITED STATES. THE IMPORTANCE OF DUCK CULTURE. THE PRACTICAL MISSION OF THE INCUBATOR ON THE FARM AND FOR DOMESTIC USE. THE PRACTICAL WORK OF HATCHING AND HANDLING YOUNG CHICKS OF ALL KINDS, AND FOR ALL PURPOSES. THE UNDERLIEING PRINCIPLES THE SAME. WHERE TO PLACE AN INCUBATOR AND WHY. THE VALUE OF VENTILATION. THE PROPER DEGREE OF TEMPERATURE FOR A HATCHING HOUSE. THE EARLY REMOVAL OF THE CHICKS FROM THE INCUBATOR, AND WHY? PURPOSE OF THE GREAT NURSERY. HOW HEATED. HOW VENTILATION SHOULD BE EFFECTED AND REGULATED. ESSENTIALS FOR THE CHICKS. HOW MUCH SPACE ALLOTTED TO EACH. THE PHILOSOPHY OF SAND, AS A RETAINER OF HEAT AND AS AN ABSORBMENT. HOW OFTEN CHICKS SHOULD BE FED AND WATERED. HOW THE FEED SHOULD BE GIVEN. POULTRY CULTURE ESPECIALLY ADAPTED TO THE PACIFIC COAST AND TO THE CENTRAL CLIMATE OF THE SOUTH.



THE difficulty that poultry culture is compelled to overcome before she is admitted into full fellowship with other and older industries is prejudice. It is difficult to divest a man of prejudice by argument or by facts and figures; he must *know the thing* and must of necessity, delay all action until others realize the merited results of more faith in figures, more energy and self reliance. Poultry raising must be boldly admitted to the same opportunities that are extended to agriculture and the rearing of all other stock. No sane man can hope to succeed in a business for which he is unprepared and of which he is ashamed.

And, need we wonder at the amazement and incredulity of the

masses, who are just awakening to the serious consideration of the high claims of this industry? Poultry Culture *is a new industry*. It was degraded for ages by inattention and neglect, because it was then impossible to make it profitable. Then it had no literature, no light, no scientific assistance, and what could agriculture and the arts do to-day without the assistance of science and invention that have also revolutionized all aspects of labor. These have actually blown the inspiring breath of modern scientific progress upon the dead body of ancient poultry culture and it stands up among the living, lively industries and commands respect. But it is not the poultry culture of the past, that must be investigated and controlled, if at all, on scientific principles that cannot be ignored. Persons that have killed and dressed chickens almost ever since they escaped from the cradle. have seen the sand in the chickens gizzard and yet never thought of putting sand in their food; and yet we assure you it will often assist digestion and check a diarrhoea when all other agents fail. Of course objections are easier than investigation; and if persons are sealed against argument, if facts and figures can make no impression, then poultry culture, nor culture of any kind will likely hold out to such, an helping hand; but to such as are willing to weigh the issues and *be honest* with poultry culture and fix, for its demands as for farming, give it confidence and capital, due dilligence, time and talent; conducting it as an enterprise that demands intelligent study, then poultry culture will surpass farming.

A few years since with \$500 invested in fancy fowls I sold \$800 worth, cleared \$500, and had left over for stock twice as many fowls.

A rich farmer, near me, with \$20,000 invested, made less clear money after charging up everything against us both, than I did; he with \$20,000 and I with \$500 invested. Suppose I had half his money to devote to poultry culture to best advantage.

I know a gentleman who quit a \$5,000 law practice, bought 160 acres of land, built and stocked it, all from 45 Light Brahma hens *in less than 10 years*.

A gentleman in Indiana worked for 50 cents per day, bought a pair of fowls, began poultry culture and within a few years bought and stocked a fine firm and now carries on a poultry commerce worth 8 or \$10,000 per year.

Another gentleman in the east began about the same way and now sells \$8,000 worth of fine fowls annually.

Another cultivates exclusively by the Incubator and has cleared over \$7 on each hen per annum and employed over 300 hens.

Again, I am in position to prove that the artificial cultivation of *ducks* for market will, and do yield over \$1 net profit on each young duck, and that any good duck will lay over 80 eggs in the course of five months.

Duck eggs hatch remarkably well and they seldom ever die a natural death. They will eat everything and require no water except such as chickens drink from a fountain. Ducks are great foragers on grass, and better still, on green young clover. They grow faster and develop infinitely better by restraining them from the pond, just as chickens and pigs and all stock do better and fatten faster when restrained from rambling in the fields.

We think it safe to calculate on 80 per cent. of duck eggs hatching in a first class Incubator and it is more than safe to count on the survival of fully 75 per cent. of all that are hatched and so if I claim that a good large pair of Pekin Ducks can be made to yield a net profit of \$30 in six months, I intend no outrage upon public credulity but am certain it can be done. I am certain I am too low in my estimate, but, am careful to be safe. These stalwart young creatures weigh  $3\frac{1}{2}$  to 4 pounds within 80 days from leaving the shell, and are certainly the finest of all food. They readily sell in cities at from 30 to 40 cents per pound early in the season. They are usually sold live weight after being bled. The meat is most delicious and once introduced is in great demand.

I need scarcely magnify the mission of the Incubator further; but, hope what we have said may be of service to all who embark in breeding fowls or chicks for any purpose. The underlying principles apply equally to poultry culture, either for the fancy or for food. Thus far we have had in view the hatching of chicks for commerce, may we suggest from experience that the hatching of a thousand chicks for *home consumption*, is anything but labor lost. If the restaurants can pay from 50 cents to \$1.50 for a nice young broiler of from one to two pounds weight, a half a dozen of such savory food every day for domestic use will go far towards making the farmer a friend to the Incubator, and Gentlemen, may I suggest to you, as a physician, that you eat too much pork and not enough fresh tender food like these very young broiled birds. If these enormous prices can be paid in cities, certainly the farmer can afford to own and

operate his Incubator and live sumptuously on these luxuries that cost him only the healthful fun of hatching them and feeding for six or eight weeks. I have tried and can consciously recommend it. We expect within ten years to find the Incubator as freely used on the farm and wherever there is a flock of fowls, as the sewing machine and other inventions that lighten labor and conduce to the health and happiness of life and the luxury of cheaper, better living.

We come now to the practical work of hatching and handling young chickens of any and all kind and for any and all purposes, since the process is identical in every particular and demands the same feed and care whether the chicks are intended for market or exhibition. An Incubator should be placed in a large light and comfortable place, well ventilated and entirely free from wind and water. Why? Because light is essential that the operator may see in turning his eggs, trimming the lamps and attending to details.

Ventilation is absolutely necessary, because the lamps are burning and the eggs also giving off poisonous gases, that soon load the air and affect the health of the incubating chicks in the eggs. Hence a cellar unless it possess these important requisites, is unsuited. The temperature should never be below 65 degrees in a hatching house, because, when the valve opens and the outside air enters among the eggs, the chill is injurious; and, when the eggs are taken out and aired for five or ten minutes, each day, after the first ten days, the air of course, should not be too severely cold. The proper temperature, therefore, for a hatching house is between 65 and 75 degrees.

The process of incubation, so far as what goes on in the eggs, has been fully considered. The directions for operating the machine must always accompany the sale; for, since no two machines are alike, any attempt to cover the action of all in a book would be burdensome. But the chicks hatched by all require the same attention, and should be removed from the Incubator as soon as dry, to avoid the poisonous gas that is generated during and after the hatching while the chick is drying. Very young chicks, thus long confined, are subject to very unhealthy air to say the least, and must be benefited by early removal to a place of equal comfort and pure, warm air. We insist on this point because, whereas, it was one of our essentials to successful incubation and the philosophy fully set forth in that connection, it is scarcely necessary to suggest the importance

of applying the principle still. when the little chicks are further along in life.

The shells removed and burned and the chicks removed and carefully and comfortably quartered in the brooder at a temperature of about 100; for twenty or thirty hours, give no feed as the absorbing yolk within the chick is all sufficient during that time. The building or nursery being divided into pens or apartments of ten feet square. may be heated by a bottom heat brooder or by circulating hot water through underground pipes or by both combined. The Success and Perfect Hatcher companies do all such work cheap and reliably.

Stoves are constructed for heating such houses with hot air or water, the water being better because it holds the heat longer. These stoves are self-feeding, of different sizes and power, and range in price from \$50 to \$300.

Ventilation should come from the top of the building, because there the heated air and gas meet and modify, the fresh, heavier and colder air. The Electric Ventilator constructed on precisely the same principle that controls the heat in an Incubator would be the most reliable register of the requisite temperature. The Incubator manufacturing companies will be glad to give estimates for such work.

The main purpose of the great nursery should be to furnish the chicks perfect cleanliness, comfort, pure air and water, and sufficient to eat. When the weather is dry and not too cold, the chicks delight to go out through an opening into the enclosed adjoining yard. They do so in quite cold weather for a short time when they attain to four or five weeks old. It invigorates their energies and appetite and should be encouraged fully to the extent of their inclination. Experience alone and intelligent observation will adjust in harmony the practical operations of this industry, The purpose aimed at in these pages is to indicate the general principles, the essentials, that are applicable everywhere and leave to each latitude and locality and to each person the carrying out of the lesser practical details according to the intended extent of his operations and his pleasure and purse.

It is plain to see that it would be impossible to prescribe details for any duty unless limited in extent and in everything to one particular plan. The essentials for incubation, we feel, are fully understood. We feel too, that thus understood, the mind takes hold of the

whole question in a broader, better and more tangible shape ; and so we shall now proceed to consider briefly the essentials of the chickens :

First : Then, how much space should be allotted to these little chicks ? We ourselves have succeeded admirably with one foot to each chick until four weeks old. A house, therefore, 24x100 feet with a four feet passage through center, the sides subdivided into ten pens on each side 10 feet square, will amply accommodate 2,000 chicks until they are four weeks old. These pens should be supplemented by runs, into which they open when warm enough to let them out, even for an airing. When the whole nursery is quite warm these young chicks take great delight in sallying out, soon to return to the warm floor of the nursery. The floor should always be covered deep with sand ; because it maintains high heat when once thoroughly warmed and so can be relied upon during the cold changes of night, and again, sand is the most perfect absorbent and so keeps the chicks quarters clean automatically ; that is the chicks themselves keep their quarters clean by scratching the offal deep into the absorbing sand. Of course, in due time, the sand must be sifted and supplied by more that is fresh ; but, this process materially lessens the labor and conduces to the evenness of the temperature and, therefore, to the health and success in careing for the chicks. With these bottom heat brooders, where the chicks can retreat from too high or too low a temperature, where the feet and body are kept comfortable, where ventilation is rightly regulated, where chicks will not need nor want to crowd, and where everything is systematically attended to the chicks will not die if rightly fed. Thus for about four or six weeks, the chicks should be kept at a temperature, at first of 100°, and then after several days, declining gently down to 98, 90 and 70°. The time at which chicks should be allowed such temperature depends especially upon their condition. If they fledge out fast and pass rapidly over the first *pin feather* critical period, and the first feathers come promptly out to their protection, then they may be moved at any time when thus conditioned, to larger but similiar and somewhat cooler quarters ; but, the change of temperature must be *guaged or gradual*, and never allowed below 70 to 80° in the house. If the chicks incline to cooler air, allow them the liberty and choice, either of house or runs when the weather is dry. So much for temperature and how to preserve it and the right degree.

If the enterprise aims at larger outlay, or more contracted operations, the apparatus for heating and circulating the water may be accordingly increased or diminished, and the same adjustment of all the essentials, including grounds, breeding birds, buildings, Incubators, brooders and all.

Chicks should be fed and watered every three hours during the daytime, the last feed being as late as 8 or 9 o'clock at night. The food should be ground or crushed and cooked or softened, but, not too wet. The feed should be given warm, but care should be taken, that it be not *too hot*, as food thus fine and scalded, long retains the heat. For this and other reasons, given in these forward pages, we urge that the cold, dry feed of corn, usually ordered at night, be set aside; and the warm, steamed feed at night be substituted; because it conveys free heat into the system at once; and, because it digests more easily and rapidly and, therefore, the same quantity of food generates more animal heat, and taxes the digestive strength less in the operation. We deem these reasons sufficiently self-evident to need no further argument. *What shall be fed*, we have already fully set forth in our articles on food in the earlier chapters of this publication, to which the reader is respectfully referred.

It will be observed that in all this enterprise the question of temperature plays the largest part.

For this reason our plans have been presented from the standpoint of the cold North, where nature is ice-bound and bleak during that portion of the year when the highest prices prevail for these tender and tempting broilers. But the suggestion is pertinent that this encouraging industry is especially adapted to the genial climate of the Pacific coast and the southern portion of the United States. If home prices in the South are less than in New England and the populous cities of the North, ice and refrigerating cars will overcome time of transit and the distance of travel and so the author commends *to all*, but especially to the citizens of the South, *Commercial Poultry Culture*.

## CHAPTER XV.

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THE COST OF RAISING BROILERS. EVERYTHING WEIGHED AND WORKED OUT FROM POSITIVE EXPERIENCE, AND CAREFUL FACTS AND FIGURES. THE CONCLUSION REACHED AGAIN BY THE AUTHOR, THAT THE POSSIBILITIES ARE \$10 FOB EACH HEN EMPLOYED IN COMMERCIAL POULTRY CULTURE UNDER THE BEST POSSIBLE CIRCUMSTANCES.

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WE have on several occasions kept the best record we could of the cost of various flocks of chicks from hatching up to three months old and found the average did not vary but the smallest fraction from five cents per pound for feed. We have instituted careful inquiry and find the experience of others very similar to our own. A friend furnishes us the most elaborate experimentation published in the January number of the Poultry Keeper, 1885 and which is so nearly coincident with my own calculations that with perfect confidence in its accuracy we quote it in full :

“ But few persons have familiarized themselves with the weight of chicks at different ages and in order that we may derive some accurate idea of weights from the shell to more advanced age we submit the following which we think will be of special practical interest.

The subjoined experiments being made to get at the exact truth. The result is as follows and may be readily verified :

The egg weighs, when fresh 2 ounces.					
The weight of	new hatched chicks $1\frac{1}{4}$ ounces,				
"	"	"	chick 1 week old	2	"
"	"	"	" 2	"	4
"	"	"	" 3	"	$6\frac{1}{4}$
"	"	"	" 4	"	10
"	"	"	" 5	"	14
"	"	"	" 6	"	$18\frac{1}{2}$
"	"	"	" 7	"	$23\frac{1}{2}$
"	"	"	" 8	"	28
"	"	"	" 9	"	32
"	"	"	" 10	"	36
"	"	"	" 11	"	41

"The chicks experimented with were Plymouth Rocks mixed with other breeds. The result will show heavier weight if the high grade cock be used with the full blooded Cochin or Brahma hen."

"They were fed mostly on a mixture of bran, oat meal and corn meal moistened with milk or water and baked, sometimes nearly cooked with boiling water. Whole wheat and skimmed milk cheese served as a variety during the first 4 weeks ; and the cake was sometimes made richer by the addition of a little animal meal (pulverized bone and meat.) Out of quite a flock not one chick died from disease. They were fed very regularly, three times a day ; and all they would eat up clean. A flock of which increased two pounds in weight a day, consumed less than six pounds of corn meal ; or its equivalent in other food, in 24 hours, and what vegetable or animal matter they could pick up, which in spite of our limited range did not appear to be very much, at least they always appeared hungry when they came for their meal."

The error in this experiment was in giving the chicks unlimited range since they derived from the constant exercise only an appetite for food which, instead of going to make fat and weight was wasted in their rambles for food. The better plan is restricted pasture and feeding every three or four hours.

From the above, however, we see that the actual expense of making one pound of "spring chicken" was in this case not over 4 cents. The market price in cities during July varied between twenty and

twenty-eight cents.

“ We might have forced these chicks faster by giving them greater variety of diet but did not attempt to force them. Or we might have grown them slower and with less expense, but with longer time had we let them shift for themselves. There were no grass hoppers. Let us analyze the weights and notice the ratio of gain.

The first week the chick did not quite double in weight; but the second week it doubled exactly.

The third week, though not doubling in weight, the gain was greater than during the second week and for some cause the ratio was not equal to that before or after the third week, the gain being only  $2\frac{1}{4}$  ounces, while during the fourth week the increase was  $3\frac{3}{4}$  ounces. The fifth week the gain is still greater and the ratio is given below:

Chicks newly hatched	$1\frac{1}{4}$	ounces.
“ gained first week	$\frac{3}{4}$	“
“ “ 2	2	“
“ “ 3	$2\frac{1}{2}$	“
“ “ 4	$3\frac{1}{2}$	“
“ “ 5	4	“
“ “ 6	$4\frac{1}{2}$	“
“ “ 7	5	“
“ “ 8	$4\frac{1}{2}$	“
“ “ 9	5	“
“ “ 10	4	“
“ “ 11	5	“

The greatest gain considering the age was made when the chick had attained the age of seven weeks, the chick then weighing  $23\frac{1}{2}$  ounces or very close to  $1\frac{1}{2}$  pounds. When nine weeks old the weight was exactly two pounds—32 ounces.

Although the weights here given refer to that of a single chick, the experiment was made with a small brood and an average arrived at. The term “ chick ” being here used simply for convenience and we call particular attention to the fact that the expense of making each pound was 4 cents, but it may be repeated that they were not forced and could have been made to weigh a little more, or by attempting to make three cents grow a pound of “ chicken ” the growth would have been less.

The quality of food is the secret of growth and we have always

claimed and demonstrated that from the time the chick is hatched until it is grown, the cost per pound is 5 cents as a maximum limit, but if the five cents be not judiciously expended it will not produce half a pound.

The paramount consideration, therefore, in commercial poultry culture is the vigor and size of the breeding stock, the quality of food for the fowls and chicks and the judicious manner of feeding.

The profit depends upon the season of the year when the chicks are hatched; about the 15th of January is the beginning of the broiler season which ends about the first of June."

This accords with our own experience and so necessitates our beginning the process of incubation about the first of October or November.

The prices are highest during March and April, and chicks that weigh half a pound retail at from 75 cents to \$1.00. Then the chicks that weigh three-quarters of a pound are preferred, which are followed by those weighing one pound.

The following will be found the safest rule for estimating the prices of young chicks at these periods. The sum of 75 cents is the price to be expected for a chick from a half a pound weight until it is six months of age. This uniform price runs in this manner: A half pound chicks sells at \$1.50 per pound, or 75 cents per chick. A three-quarter pound chicks sells at \$1.00 per pound or 75 cents per chick. A pound chick sells for 75 cents. A one and a half pound chicks sells at 50 cents per pound or 75 cents per chick, and so increases in weight and decreases in price until the chick weighs 6 pounds and sells at 12½ cents a pound or 75 cents per chick. Of course the prices sometimes vary, but we can safely assert that if one half pound broilers reach the market in March and the chicks brought in continually until the season for "spring chicken" is over there will be no difficulty about prices. The figures given are retail prices for one dozen chicks.

Observe that in the experiments given the chicks weighed 10 ounces when 4 weeks old. The cost up to that age is *just two cents*; we throw off the two ounces for a margin and leave the weight 8 ounces at one month old. Now let us suppose that, instead of selling the chick at 75 cents, we leave a great margin in price and call it 25 cents. We will then have 23 cents clear profit from an expense of 2 cents for food.

In the experiments, however, the chicks gained a quarter of a pound the next week and while weighing 10 ounces, at 4 weeks old, reached 14 ounces when five weeks of age, having gained a quarter of a pound the fifth week and as the ratio was more than a quarter of a pound each week thereafter, often reaching five ounces, we may safely claim that up to the age of three months a chick will gain at least a quarter of a pound per week, as follows :

Chicks	4 weeks	old	$\frac{1}{4}$ pound	
"	5	"	"	$\frac{3}{4}$ "
"	6	"	"	1 "
"	7	"	"	$1\frac{1}{4}$ "
"	8	"	"	$1\frac{1}{2}$ "
"	9	"	"	$1\frac{3}{4}$ "
"	10	"	"	2 "
"	11	"	"	$2\frac{1}{4}$ "
"	12	"	"	$2\frac{1}{2}$ "
"	13	"	"	$2\frac{3}{4}$ "
"	14	"	"	3 "

In the experiment the chicks weighed two pounds at eight weeks old, but we have allowed two extra weeks for a safe average for an entire brood, as some of the chicks may be sickly or inferior, but we could have easily put down that a chick will weigh three pounds when three months old or even more for we have often had them to weigh four pounds at that age.

Another experiment which we have made previous to the one copied above demonstrated that chicks double in weight every 10 days until they are 40 days old, but such rule is not infallible, as we find the gain greater at some periods than at others, but the cost of food for the second experiment was one cent a week until the chick was 10 weeks old, when the expense increased and so did the weights. It is admitted however that the chicks were not as well fed and provided for as they should have been. The cost was of course less than one cent until the fifth week, which was exactly one cent and when the tenth week was reached the total amount expended for each chick was exactly 10 cents for 10 weeks, the small amount eaten the first four weeks leaving a surplus which was added to the latter period of the experiment. The weight of a chick at the end of 6 weeks was exactly 18 ounces or a pound and two ounces, the cost being 6 cents

Let us now look at the table and notice how it compares with the others, we doubling the weight of the chicks every ten days :

Chicks at hatching	1¼	ounces,	
“ 10 days old	2½	“	“
“ 20 “ “	5	“	“
“ 30 “ “	10	“	“
“ 40 “ “	20	“	“

Now compare it with the first result which we gave in weeks and we find that in three weeks the chick weighed 6¼ ounces while in the case just mentioned the chick in 20 days weighed five ounces. We are satisfied with the difference or rather the close result. In thirty days the chick doubled from five ounces to 10 ounces. In the result by weeks we find that the chick four weeks old weighed 10 ounces, only two days difference in ages between them. In 40 days the chick weighed 20 ounces, having doubled again in 10 days. In the result by weeks, we find the chick at seven weeks old weighing 23½ ounces and as the two days difference is something, it partially compensates for the heavier weight; but we have demonstrated by two different experiments that a chick will double in weight every 10 days until it is 40 days old and that though not doubling after that time the ratio of increase is, however, very rapid. It is conclusive then that a chick will gain at least one quarter of a pound every week on an average, until it is three months old.

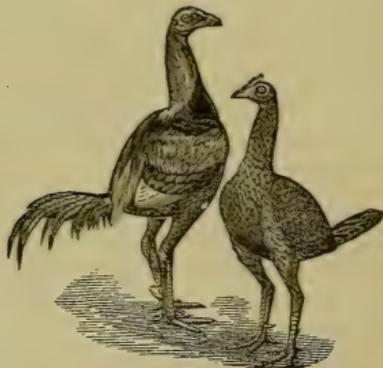
In one experiment we found the cost of food four cents a pound and in the other we made it more but as the cost of food for the six weeks was six cents and the chicks weighed about 18 ounces, which is one pound and two ounces, the cost was a fraction over five cents a pound, but the ratio was reduced as the chicks advanced in age, as the gain in flesh was greater and hence in order to leave a fair margin we can confidently state that the maximum cost of a pound of chicken from the shell to maturity is five cents, but maturity means the moment a chick becomes a fowl, as it is easy to see that a fowl when once it has reached the limit of its weight, may become five years old and yet not weigh an ounce more but consume any amount of food. Thus young poultry can be produced the cheapest and with considerable less trouble and a better market.”

Suppose then we are fully prepared with houses, runs, heating apparatus, machinery for cooking our food and every contrivance for the better care and comfort of the fowls and chicks, suppose that

our parent stock be Brahmas and Cochins with high grade cocks as advised in these pages, suppose our process of cooked food be enriched with ground meat from such dead animals as can often be secured as a gift and we feed these chicks every three or four hours what they will freely eat. The truth is irresistible that we should gain much in weight at the tender age of four weeks and be enabled to market them before they were large enough to occupy much space and at a net profit of from 40 to 70 cents per pound. Now we will suppose that our pullets lay 80 eggs each in six months, and that is a very low estimate since Mrs. Judie's Light Brahma pullets, advertised in this book, exhibits an egg record of over 90 each in a little over five months, we will suppose that we hatch and raise one half of these eggs into vigorous chicks, and sell them at from 60 to 70 cents per chick at four weeks old, the net profits per hen thus accruing, must closely approximate \$15 or \$20, but, barring all accident and leaving the largest of margins that seriousness and honesty could ask, we think we shall not be criticised as uncandid nor extravagant in calculating the actual profits of commercial poultry culture at \$10 per hen during a period of six months, if planned and prosecuted as here advised.

We think from the foregoing, data may be furnished to enable all to see this subject and estimate its worth.

We therefore close the consideration of this department of poultry culture in the honest belief that it promises more than any other known industry for the labor and capital required in this enterprise.



## CHAPTER XVI.

A POULTRY FARM FOR EGGS. ITS REQUIREMENTS. HOW DISTINGUISHED FROM THE OTHER TWO DEPARTMENTS OF POULTRY CULTURE. ITS ESSENTIAL OUT LAY. THE AMOUNT OF LAND AND WHAT KIND. THE KIND OF BUILDINGS FOR 1,000 HENS. THE VARIETY OF HENS. HOW TO MANAGE. HOW TO ECONOMIZE. THE QUESTION OF THE MANURE. ROOSTS AND NEST. HOW TO PRESERVE THE EGGS. THE "HAVANNA METHOD" A FRAUD. THE ONLY TRUE PLAN OF PRESERVING EGGS. THE AMOUNT OF EGGS 1,000 HENS WILL LAY. THE PRICE TO BE EXPECTED FOR EGGS IN JANUARY AND FEBRUARY. THE PROFITS OF THE EGG FARM. CONCLUSION.



POULTRY farm for eggs exclusively : We have classified the natural divisions of a poultry farm under the caption of a poultry farm for commercial or market poultry ; a poultry farm for thoroughbred fowls and a poultry farm for eggs ; and having considered the first two in their somewhat intimate association, as governed by the principles that apply to careful poultry culture in general, pointing out the exceptions and essential distinctions between the two departments of the industry, we come now to offer only a few considerations that shall include the third and last department, viz. a poultry farm for eggs.

If we cannot offer such fascinating figures in this as in the possibilities that fill the other fields, fill them with facts, fill them with experimental demonstrations that drive out all doubt, if the egg farm be modest in comparison and content with its revenue, it has in its favor a few important facts that merit our consideration and its introduction to the full fraternity of the other departments of the great poultry industry.

In the first place a poultry farm for eggs requires but little capital. That: then is a solid virtue. Let us specify. We need in this

no heating machinery, no division runs, no cocks to keep apart, no Incubator nor brooder, nor any expense of advertising or exhibiting which costs so heavily in the other departments of market and fancy poultry culture. These heavy drafts done away, the actual expense of this last and easiest enterprise is certainly very modest.

We have nothing to do with male birds and so escape all rules and regulations of mating and expense of sub-divisions, forests of fences and their great expense.

We require a two-horse shelling and grinding machine to crush our corn, oates, barley and cereal food and a chaldron for heating water to scald the food. Bran and shipstuff can be bought ready for use and suitable to mix with other ground food as good and cheaper than wheat.

Oyster shell and bone meal can be bought as cheap as we can prepare them and so we escape the care and cost of the process. We have proposed to ourselves to offer at the last of this love feast with our friends the best of our book, and, if it shall be blest in its mission in calling away from the other over crowded industries the capital and confidence required in this, if the great producing classes of my countrymen shall be incited from what we have said to seriously consider this question and decide to embark in this business and remove the stigma from this "granary of the world" implied in the annual importation from foreign countries of over 16,000,000 dozens of eggs to be consumed in this country, we shall feel that full satisfaction that flows from honest patriotic services to country and human kind.

We need perhaps ten acres of ground for our pasture as we shall call it instead of a yard or pen. Our house should be built in the center of this clover field which should be set in the midst of an orchard. We need the shade and the hens will help the trees by eating all the insects and so we cultivate a double crop. We select for our purpose say 1,000 hens and assign them to this clovered orchard of ten acres, surrounded by high and heavily barbed wire set closely together to keep out intruders. In the center we build our house. This house can be built very crude and cheap or very elegant and costly, but the idea kept constantly in view all through this book has been to present this subject in its cheapest best and most economical aspect otherwise we should have ordered our entire roof of glass and indicated other elegant outlay in keeping, but we doubt that

spending money for display beyond the actual necessity and come fort of the situation can be justified in ourselves much less can it be defended in advice to others.

The question then in this connection is, how can we accommodate with safety and comfortable quarters 1,000 hens? The main house should be 300 x 12 feet making 3,600 square feet. The plan should be the box house or pine plank nailed upright to sills and plate, roof sloping one way, this requires no frame nor rafters as the roof which should consist of pine plank sheeting may be nailed at each end to the plates and supported in the center by two rows of stringers, 2 x 4 pieces, running parallel and four feet apart the full length of the building. These rest the roof in the center and the plates at the ends. So stayed, supported and fastened, the roof forms the top of the box and renders it firm and reliable and saves all framework and material. This roof should be covered with 2-ply tarred felt and graveled. The front or higher side of this house should be 8 feet and look to the north and the lower side 5 feet high and look to the south. This would let the roof slope to the south. Then set the roof as thickly as need be with large sash of glass for perfect light which would also contribute much to the warmth. Then on the north side, the higher side of the house, build a shed ten feet wide and the full length of the building, let it join the main building and its roof slope north and be covered as the building by tarred felt and gravel, this would protect them from the north wind and give 3,000 more feet, 6,600 square feet in both building and shed so combined. The communication between the two apartment could be made through doors. The floor of both buildings should be made of fine rock down to the depth of four inches, filled in with sand and covered with cement. This is necessary to keep the hens from scratching holes in the dirt floor but more especially to keep minks from entering at night and cutting the throats of 50 or 100 hens. The floor then covered deep with sand absorbs the manure and this sanded guano will sell for four times as much as will pay for all the sand, its hauling and handling.

The nests should be so constructed as not to take up the room within the house and so should be built in the shed near the ground against the partition and entered from the main building through holes cut through the partition and so letting the hen enter the nest from the main building.

The plan of the nests should be a long box running the full length of the building, partitioned so that each nest would be 16 inches or a foot square, depending upon whether large or small hens were used. The eggs to be gathered from the shed by lifting the top of the nest which might be made to hinge open.

Other plans present themselves to me and still others will be suggested to others, and, bear in mind that all the plans that I offer are not at all arbitrary but simply suggestive and such as commend themselves for simplicity and economy. The purpose being to be practical to make money. The roosts should run the full length of the building if necessary and consist of a folding frame attached to the south inner side of the shed, so constructed by hinges that each morning each section of the frame roost may be folded up and fastened against the side of the wall to which it is attached and let down again at night and so be always ready when wanted at night and always out of the way when not needed during the day. Thus each morning the roosts may be raised and the droppings be gathered with a small amount of sand with a shovel and barreled ready for shipping when full.

This much for our houses and contents except the water and feed. The former should be furnished from an ample cistern and pump within one end of the building supplied from the vast amount of roofing and the water pumped fresh for the hens in a suitable trough, three or four times a day inside the house in winter and outside in summer. The ground, steamed food fed in shallow troughs in the same way.

The ventilation should come from the highest point in the house, namely, its junction with the shed, and, where the air is allowed to enter the descent should be broken by a partial loft to avoid the evil influence of the least draft upon the fowls. Watchfulness and intelligence are requisite to decide when the fowls are comfortable and healthful.

We come now in order to consider what varieties are best for this business? We want a fowl that will lay the most eggs possible, that will eat the least amount possible, that will not become broody, that are extremely hardy, that will diffuse themselves all over the ten acres of ground, that will not lay about and get too fat for this use. What fowl will fill the full measure of this requirement? We want a fowl at the same time of sufficient size that when we want to fatten

it in the fall for market, just about the period of moulting, it will weigh about 6 or 7 pounds, net. This must force our selection to a cross between the Leghorns and Asiatics or to the Plymouth Rocks, pure. But are we compelled to an annual sale of the whole thousand hens and replacing them with pullets? And shall we make or lose by such annual sales? We are obliged to sell unless we can depend upon the non-setting integrity of our hens the second summer and this can only be claimed as applicable to the Leghorn hens and so the Leghorns must be our choice unless we annually sell off the entire stock, for no other variety can be depended upon for two successive seasons. And if it be found advisable to fatten and market just before moulting to escape the dangers from cholera among so many hens then we do not want the Leghorn on account of its being too small and because it will not lay any more eggs the first season, then the Buff Cochin or Brahma. If the size or weight of the egg entered into the question of price, then the Asiatics or high grade birds would be much the best, but so long as eggs are sold simply for so much per dozen, irrespective of size, then the Leghorn eggs are as profitable as any, and so these questions are introduced for practical consideration and we think fully illustrates the importance of what we aim at in this work, namely, of presenting every side of the subject under the caption of what we may truly call "The Principles of Poultry Culture." We are inclined to advise for this farm the Leghorn pullets and try them the second year. We need no fire or heating apparatus to this enterprise since it is not our purpose to call upon our pullets for eggs in the winter. We aim to carry these pullets through the winter well nourished for vigorous laying from January on until August thus covering the most prolific period of her life. The purpose being to pack the eggs the next morning after they are laid or the same night.

And now we confront the question that has barred the great mass of those who keep poultry for profit from entering commercially into the production of eggs, we refer to the difficulty of preserving them for any considerable time perfectly pure. The difficulty that all have encountered should we think be first pointed out and then the right direction and the reason. We ourselves tried the famous "Havanna Method" and failed; first, because the "Havanna method" like the "Common Sense Hatcher" is destitute of the very essentials upon which success wholly depends. Second, it does not

exclude the cocks from association with the hens and so allows the eggs to become fertilized. Such an egg is very easily injured by the action of heat and it is almost impossible to gather eggs promiscuously and not include in your packing many that are blighted, even after subjecting all to the closest test before a strong light. If only a few be blighted they injure all the rest, and so this fundamental fact is foreign to the method above mentioned. No method can keep pure eggs perfect if once they be fertilized.

What are the facts as afforded by actual experience? An egg fertilized and subjected to heat will evince the transforming influence of the vital germ in a very few hours, whereas an egg not fertilized may be placed in an Incubator and subject to one hundred and three degrees of heat for ten or fifteen days and the egg will then look and smell and taste and digest perfectly pure.

These are the all sufficient tests and prove that non-fertilized eggs will keep perfectly as against heat.

But, how shall we pack them for certain success and assurance that they will be preserved pure through the whole of the spring, summer and autumnal season on until the price of eggs reaches from 25 to 40 and 50 cents in December and January? We answer, have no male birds on the place, raise your own eggs, gather them every night, let them get cool, pack them in perfectly pure and clean large boxes in a deep, dark, cold cellar in salt, with the big end of the egg down and the little end up, with salt between the layers and also between each egg. Why the big end down? Because the air chamber is then at the bottom and supports the egg and as the air cannot escape upward and out but is beneath the egg's substance it does not escape at all. Whereas if the small end be down the air evaporates and the contents of the egg descend into the contracted space of the small end and often ruptures the lining membrane or allows air to enter above it and below the air chamber. Thus surrounded with the chlorine in the salt and free from any principle that can awaken change within the egg, thus packing on the big end and away from the light and where it is cool eggs will keep sweet and pure all summer. The limeing process we think injurious because too caustic and has the effect when in solution of encrusting the egg and changing the color of the albumen a greenish straw color. All this requires much care in washing when ready for shipment. But we have been asked, "Is it possible that hens will lay without a male bird?"

Persons who have raised chickens all their life ask seriously how long it takes the Incubator to hatch its brood and if we are in earnest in the assurance that ovulation in the hen is entirely uninfluenced by the cock? Surely poultry culture is in its infancy.

Well, we shall assume that no one will doubt that vigorous and well cared for Leghorn pullets will lay 130 eggs each inside of eight months. This with 1,000 such pullets would give us 130,000 eggs or 10,833 $\frac{1}{2}$  dozens and counting these at 25 cents per dozen, gives us \$2,708.25 or barring all accident and leaving a wide margin in price since at the season of the year specified it is never difficult even in villages to command from 35 to 45 cents for good eggs in January and until the 25th of February, but in great and populous cities it is more than reasonable to assume you can engage your ten or fifteen thousand dozens at from 35 to 50 cents per dozens,

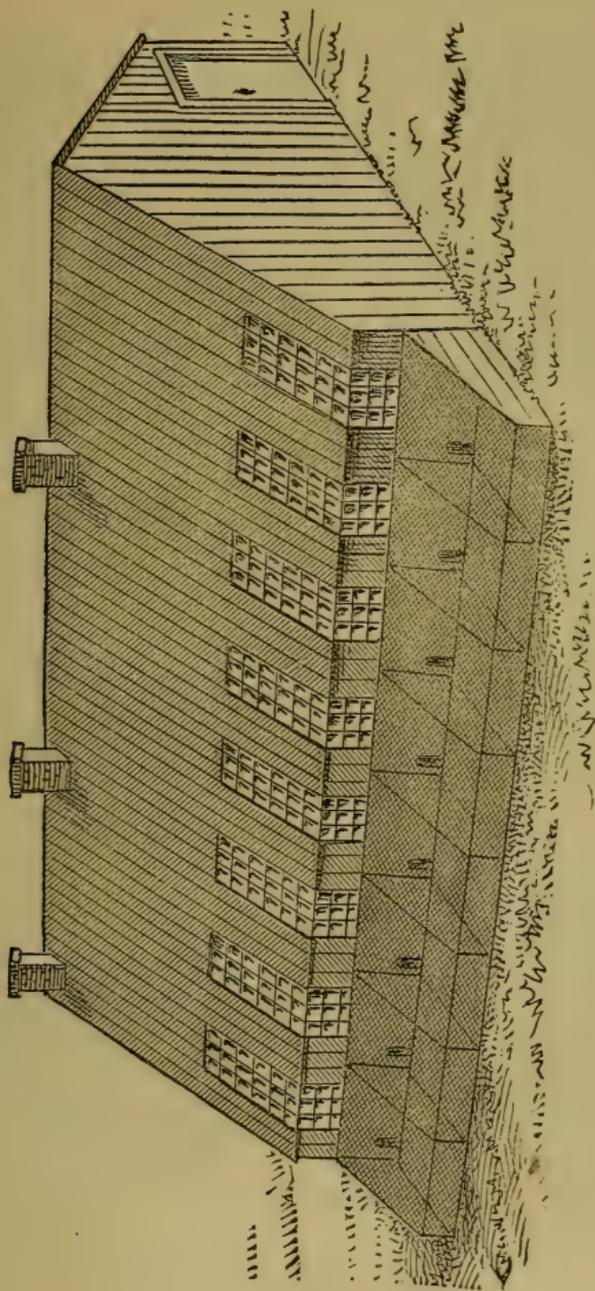
Thus the egg farm with but little cost and care when compared with all other avocations that yield the same income will be found the least hazardous and tho most fruitful. We believe it entirely safe to estimate a net profit of over \$2 per hen.

We have endeavored in presenting the great subject of poultry culture to the public in its triple aspect, divided as we did into its natural departments, to place each department before the public on its legitimate business basis. We, of course, could not be expected to assure any one nor do we know the realities wrapped up in either branch of this industry. We can offer you as much exactness as in agriculture or in merchandise or in the professions, we have given the underlieing principles of poultry culture and introduced it with all its past and its present status to your consideration. We have aimed above all things to be honest and place before all, the facts and the philosophy in their support, so that all might judge of the justness of our conclusions. In short, our purpose has been from the beginning of this book to include in its scope an honest advocacy of artificial incubation, and rearing chicks of all kinds, including their feed and essential necessities, their mating, management, diseases, cause and cure; the possible profits of all departments of poultry culture and its history, past and present; its development and all the influences that effect it. We have given it much thought and labor and hope we have succeeded to your satisfaction; and now dear friend, whoever and wherever you may be, if after you have read this book you desire to become a poultryman by profession be

careful and educate upward, slowly, economically and thus surely. Do not hurry! the field will never be full. Its history points the other way, but that need not discourage us. We have intimated the prejudice and inacquaintance with the fundamental principles of poultry culture and have aimed to remove the dangers to be dreaded through disease. We believe we have proved that poultry culture will pay, and now as we part from this delightful theme we feel a sadness in saying farewell. We offer you all with our blessing and the hope that these pages will prove of great service to your business of scientific profitable poultry culture.

Yours Fraternaly,  
T. B. SPALDING.





### Brooding House and Outside Runs for Young Chickens.

Designed by I. K. FELCH, Natick, Mass.

Used by permission and courtesy of W. H. Harrison, Esq., publisher of Mr. I. K. Felch's new book on Thorough-bred Poultry Culture.



THE illustration and description of the Brooding House, with the article following is by I. K. Felch, and considering it of great merit, we asked permission of the publisher of Mr. Felch's book, Mr. W. H. Harrison, of Chicago, to use it in our book. Mr. Felch, says:

Our plan for a chicken house is different from all others we have examined, and our brooders different. But Mr. Tribon, of Brockton, Mass., has the same thing, to all intents and purposes, only he uses a plain sheet of zinc instead of the water pans, relying on dry hot air, which we are not sure is just as well in the winter as to secure the moist heat over hot water, as per plan of brooders.

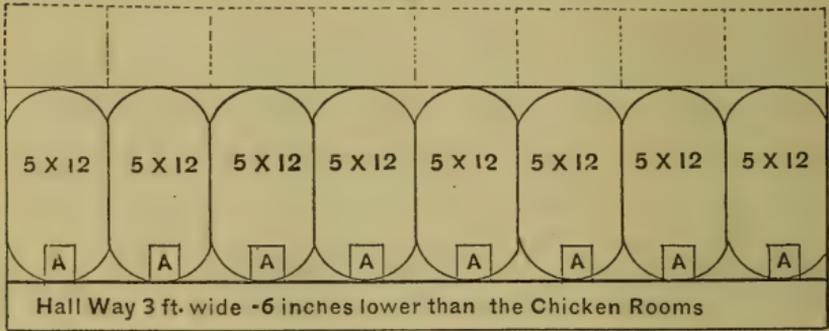


Fig. 2

GROUND PLAN FOR CHICKEN HOUSE.

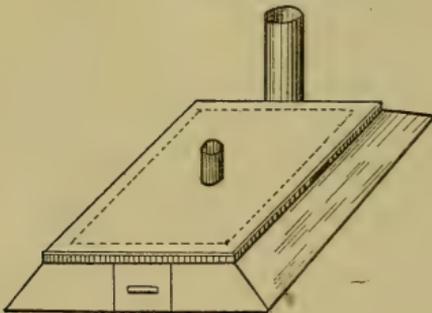


Fig. 3

A BROODER

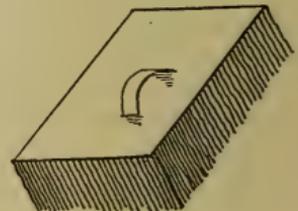


Fig. 4

Our chicken house is 15x40 feet in main building, cut up into a hallway (see ground plan), 3x40 feet and six inches lower than the

chicken rooms, eight in number, matching the eight wire projections 5x4 in front to enable the chicks to take the air at will. They should be induced to take advantage of them by feeding them meat, exciting them to exercise while enjoying the tidbits of their noon meal. Each of the 5x12 foot rooms is furnished with a brooder (see Figs. 3 and 4), the base (Fig. 3) being made square in front with a door to admit the lamp, the two sides and rear end being cut mitring, so as to have a base nine inches high. On this base rests a galvanized iron pan three-fourths of an inch deep, the rear flange wide enough to let through a tube of tin one and one-half inches in diameter, that all smoke may escape from as well as give draft to the lamp. Above the flange of the pan (by which means it is held in its position) a strip one half inch, or say three-fourths inches thick, and one inch wide is nailed, except on each side and end is left a gap of one inch, making an air-hole three-fourths by one inch (see Fig. 3.), and upon this rim rests the floor of the brooder one-half inch thick, thus leaving between the floor and the water in the pan an air-space one inch in height. In the center of brooder floor see tube two inches high and one and one-half inches in diameter that draws the hot air up from over the tank as it becomes warmed in its passage from the sides through the air-hole over the water, and it is radiated out over the chicks and escapes through the fringe of the brooder cover (Fig. 4), the cover resting on the base (Fig. 3), as indicated by dotted lines. The brooder is heated by a kerosene light of the Diamond burner style. The base of brooder is 45x48 inches when it rests on the floor, and 30x36 on the floor of the brooder, the cover being 22x30 inches long. On a warm night the chicks will lay all round the cover on the rim of the floor outside, and for this reason we make the cover smaller than the floor of the brooders. By our ground plan you see from the hallway these brooders (Fig. 2, A) are fitted into the chicken rooms so the floor of the brooder only rises two inches above the chick's earth floor: this gives easy access to the brooder for them. This we believe the best and cheapest brooder one can build.

## American Poultry Food.

Trial Package, one lbs., sent by mail,	\$ .50
Two lbs., by express,	.70
Five lbs.,	1.25
Ten lbs.,	2.00
Twenty-five lbs.,	4.50
Fifty lbs.,	8.00

## Pure Crushed Raw Bone.

The bone we sell is made from selected shank bones, are crushed *raw*, and thoroughly dried, thus preserving all the gelatin and nutriment of the bones that are entirely lost when the bones are *boiled* or *burned*. No poultry raiser should be without bone in his yards, if he wants strong healthy fowls.

Fifteen lbs., by express,	\$ 1.00
Twenty-five lbs.,	1.50
Fifty lbs.,	2.50
One hundred lbs.,	4.00

Add 50 cents for Cartage if sent by Freight.

## Granulated Oyster Shell.

This shell is all made from clean, sweet, fresh oyster shells, and is the best that can be produced.

Twenty-five lbs., by express,	\$ 1.00
Fifty lbs.,	1.75
One hundred lbs.,	2.50

Add 50 cents for Cartage if sent by freight.

## Ward's Roup Pills.

These pills are intended for obstinate cases of Roup, and will, if followed up by care and cleanliness. cure in nearly every case.

Box 50 pills, sent by mail	50c
Box 100 pills,	75c

## Ward's Cholera Pills.

These pills have cured many cases of Cholera that seemed hopeless. But no medicine can cure all cases of Cholera, for if not taken in time, it will not do any good.

Box 50 pills, sent by mail,	50c
Box 100 pills,	75c

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*For sale by American Poultry Journal, Chicago, Ill.*

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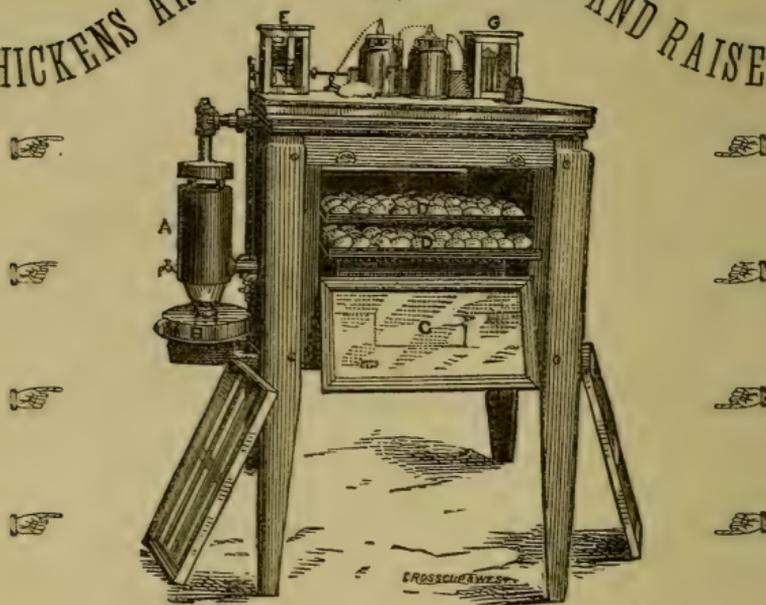
Is a 48 page book, for treating diseases of poultry. Giving, concisely, the symptoms of each disease, and remedies for their treatment and cure. Also directions for Caponizing fowls, and the feeding and careing for chickens hatched in an Incubator, and many other things useful to the amateur and experienced breeder. Price only 25 cents, paper cover, or 40 cents bound in cloth. Address.

**American Poultry Journal,**

103 State Street,

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CHICKENS ARTIFICIALLY HATCHED AND RAISED!



—BY THE—

## PERFECT HATCHER AND BROODER,

Are the strongest and healthiest and obtain the highest prices. Chickens by our system can be hatched and raised to three months of age at a cost of 5 to 8 cents per pound. The prices obtained are from 20 to 80 cents per pound, the year through. *Can you see the profit?*

The artificial production of poultry is daily increasing in popularity, and is destined to become a great and remunerative industry. It is a business suitable for all classes of people, and can be conducted with success by the Clergymen and his family, as well as the farmer and fancier. It is easily managed, and is already carried on by the sons and daughters of many prominent citizens as well as mechanics, etc. The invention of the perfect Hatcher and Brooder

has completely revolutionized this trade and thousands of chickens are now being hatched weekly to be sold as broilers, for which there is an ever increasing demand, at such prices as cannot fail to be remunerative.

The great problem, never before solved is how can a young man with a moderate income and a growing family, and a wife who is ambitious to assist in earnings and support of the family—how can she do her share and still remain at home to care for the children and house. This problem is now solved by our system. Any one with a good, ordinary city lot, say 60 x 125 feet, can put up a building that will hold and raise to three months of age 2,600 chicks, and place in the market at least 800 chicks per month, on an average profit of 20 cents each, eight months in the year; they can use our Portable Brooder, if on a rented spot, and place 400 chicks in market per month, from same space. This business also commends itself to widows with a growing family—clergymen, old people who can do light work, and a host of others to whom most avenues of employment are closed, and remain at home and be independent. The market for this product is unquestioned. See our large circular for facts on this point.

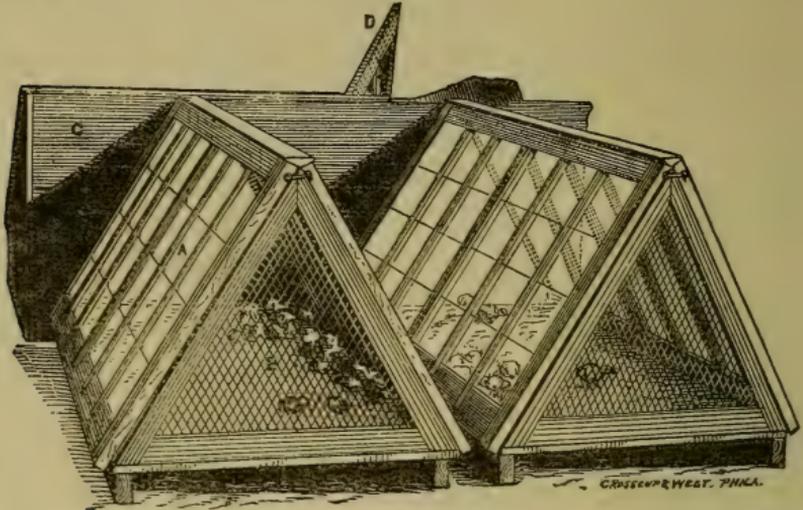
The largest part of our trade to-day is from our old customers, which is proof positive of the merits of our system. Our Incubator is known throughout the world as the standard Incubator. We have during the past year filled orders for the Ostriah Farms in California, besides others for export to the following countries: Japan, Constantinople, Turkey; Brazil, Panama, New Zealand, Gibraltar and Barcelona, Spain; Sweden, England, Paris, France; Mexico, Sandwich Islands, and many other parts of the world. All this in addition to our domestic trade, which extends to every part of the Union. We can furnish testimonials by the hundreds—they come in every mail.

 For further facts and information, address,

THE PERFECT HATCHER CO., Elmira, N. Y.

# THE

# PERFECT BROODER.



In offering our Brooder, with its latest improvements, we are confident it is in every respect what its name implies. We are conscious that our earlier plans of brooders were not a success ; but it took time to develop all their defects. We therefore have been steadily advancing, until now we know it will do its work successfully, and is the successor and rival of the natural brooder—the hen. It is well known by all how she broods her chicks, viz., she sits upon the ground ; the chicks run under and around her body, with which they come in contact ; they are enveloped in her feathers and are surrounded on all sides by her warmth. She even warms the ground slightly, and thus keeps their feet and legs warm, which we find to be of the utmost importance. It would therefore seem that from the teachings of the mother hen, a successful brooder should long ago have been devised, but strange as it may seem, we have all gone astray. But we claim now to have solved the problem. The successful brooder must be based upon the principle of the hen, viz : a com-

comfortable warmth surrounding the chick, a warm floor—but not too warm—and a comfortably warm atmosphere surrounding the chick. The chick needs to lie down and sleep like any other animal. They cannot lie down on a cold floor; it must be warm or they will huddle together, and then the mischief is to pay. The atmosphere must be warm or they will suffer. There must be good ventilation, and constant, or they will be poisoned by their own carbonic gas, the same as would result from a dozen people sleeping in a small room with all the doors and windows closed. The brooder must be portable; it must be placed on the ground, so the chicks can run in and out at their pleasure on pleasant days; it must be storm proof, and proof against all animals dangerous to chickens; it must have ample room for the chicks, so they can be kept inside on all cold and rainy days; It must have a glass run, so that when the wind is sharp in March and April, November and December, the chicks can bask in the sunshine and bid defiance to the cold, shivery winds. It must be of that adjustable character to circumstances and seasons, that it can be placed in a building of any suitable character, or out on the lawn, or in the field, at the pleasure and convenience of the owner. It must be so arranged that a person can raise the largest number of chicks possible, in a state of health, on the smallest possible spot of ground.

## ◇ SUCH A BROODER! ◇

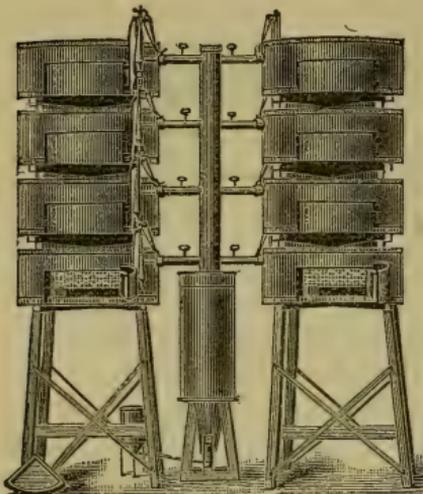
We offer to the public, to whom we appeal to judge it upon its merits and with good common sense.

Our system of brooding is in every respect equal to our system of hatching, and we can show that a loss of five per cent. in raising is too large, if proper care is given. We invite all interested to call and see us—see our Factory, our Brooding house, which holds 3,500 chickens, and see the chickens themselves. We can prove what we claim. All information free.

PERFECT HATCHER CO., Elmira, N. Y.

# AXFORD'S INCUBATOR,

The Original, Most Successful and Complete in the World!



Price \$170.00

An Introduction given to Axford's Incubators at Colonel Wood's Museum, Chicago, by one of the Managers.

These are Incubators, hatching by artificial means. Early chicks are what we want; hens have no such desire. In 1870, with all the resources of science and skill, it was a marvel that attempts had not been made successful to excell Egypt and China, where for hundreds if not for thousands of years they have been hatched in immense numbers. There the favorable conditions must not be forgotten. The profession being handed down from father to son, and all its details kept religiously secret. No European has ever been allowed to visit the interior of the oven. Here we show you the Chicago style! Mr. Axford, schooled in the geological

museums of London, and having been awarded prizes for electrical instruments in that city, in 1864, was a fit man to undertake it, and was first shown here in 1875, hatching chickens between Christmas and New Years. Chickens from it hatching on the cars, in the Northwest, with the thermometer 20 degrees below zero; on the upper decks of the U. S. mail boats, on the Mississippi and Ohio Rivers, to Canada and sunny Mexico it has pleased thousands. They are also hatching now on the lakes. Mr. Axford ran 23 at the Southern exhibition, the grandest effort ever made of modern incubation and were the only ones present. The machines are quite simple, and if you have any friends in the country, they will be under obligations to you when you send them our circular.

We have now excellent facilities for doing fine work, having introduced machinery, and employ non but the best of skilled mechanics.

Look out for the original as infringements are out.

"No Incubator is of any value unless it contains within itself every condition that nature furnishes for the successful hatching of the chick." Here is where the Axford lays out all other competitors.

Send stamp for circular. Be sure and write your Name, Town, County, and State, plainly, and give full shipping directions when ordering.

Inquire at 5th and Cottage Grove Avenue.

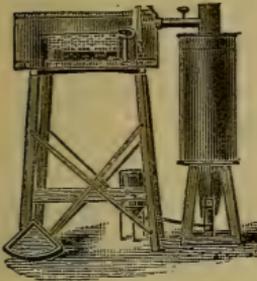
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Take Cottage Grove Ave. Cars, or Ill. C. R. R. to 43d St.

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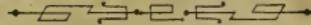
The Original, Most Successful and Complete in the World!



Price, \$30.00, Capacity 11 Dozen.

“ 60,00, “ 35 “

Additional Nests of any Capacity, may be added at any time. Price of 11 Doz., \$20.00, and 32 Doz. \$35.



Seasoned and Re-tested Thermometers, Boxed \$1.

—Sent by mail free—

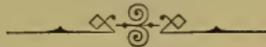
## GET OUR EGG TESTER!

And thereby hatch twice as many chickens. The result will surprise you!  
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Is a wonder, and will always do good service as an extra guard against accidents, or any maliciously disposed person. As an alarm in case of fire it is invaluable, and will save lives and any amount of property. Price \$6.00, including the battery.



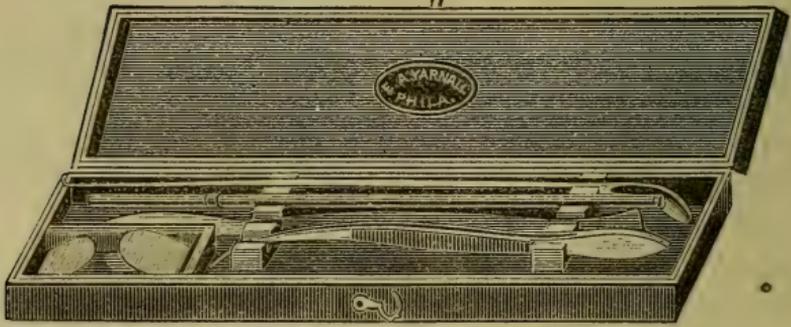
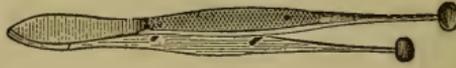
We have never sold Brooders, but give plans to our customers how to build them, as well as cheap permanent brooding houses for large quantities in which chicks can be grown cheaply with ease. But for any who may not have the facilities, we will make one for sample, for 50 chicks with lamp, etc., \$12.

Send stamp for circular. Be sure and write your name, town, county and State, plainly, and give full shipping directions when ordering. Enquire at 45th and Cottage Grove Avenue.

**AXFORD & BRO.,**  
**CHICAGO, ILL.**

Take Cottage Grove Ave. Cars or Ill. C. R. R. to 43th St.

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INSTRUMENTS FOR MAKING CAPONS,

WITH FULL PRINTED INSTRUCTIONS.



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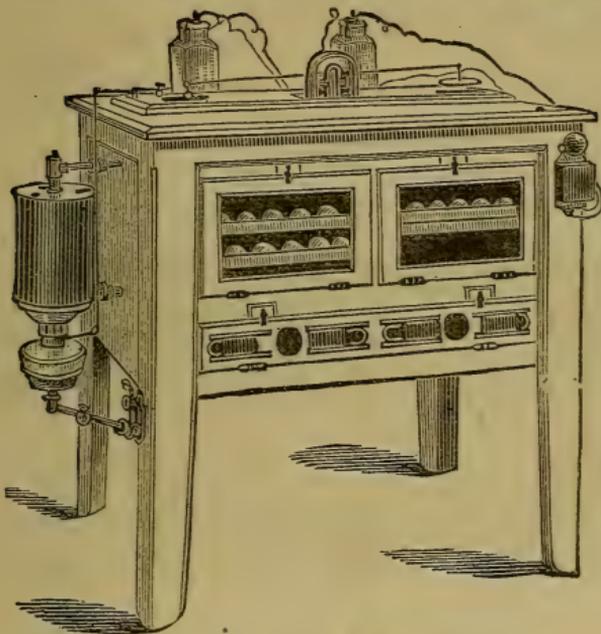
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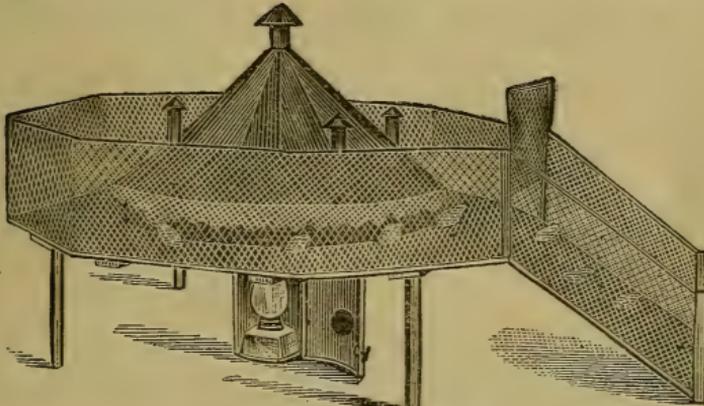
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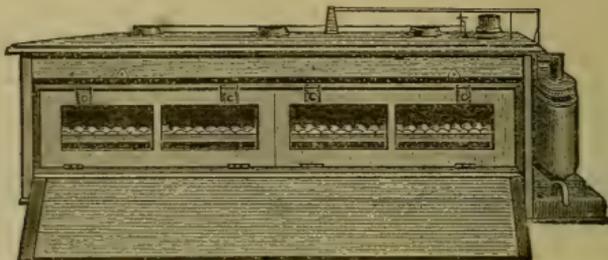
It is just as perfect as the Hatcher, positively non-crowding, perfectly heated and ventilated, and has all the essentials of a first-class mother.

**T. L. COUSINS & CO.,**  
Kane, McKeen Co., Pa.

Send for Descriptive Pamphlet.

◇ THE ◇

# MONARCH INCUBATOR.



This machine has made the best public and private record of any Incubator ever invented. It has never hatched less than 90 per cent. of the fertile eggs wherever it has been exhibited in public.

The "Monarch" won the first premium in the great competition of Incubators at Madison Square Garden, New York City, February, '85., for hatching the greatest number of chickens, and the best percentage of eggs. Thirty-two machines competing, W. C. Baker, Judge.

The eggs were carried three hundred miles in a trunk the day before hatching.

WALTHAM, Dec. 11, '84.

The committee on awarding the prize of forty dollars, offered by the "Waltham Fanciers' Club," for the best approved Incubator in actual operation, hatching chickens during the exhibition, Dec. 9, 10 and 11, 1884, awarded the prize to the "Monarch" Incubator, invented and exhibited by James Rankin, of South Easton, Mass. And the committee do hereby certify, that the hatch was 95 per cent. of 475 eggs which were placed in the Incubator the first day the exhibition opened; and that the eggs were out of the Incubator three hours and fifteen minutes in transportation, and were transported forty miles by rail and four miles by carriage-road before arriving at the exhibition.

J. H. SWASEY, }  
GEO. WOLLEY } Committee.  
W. E. SHEDD, }  
TAUNTON, Jan. 11, 1884.

Mr. JAMES RANKIN:

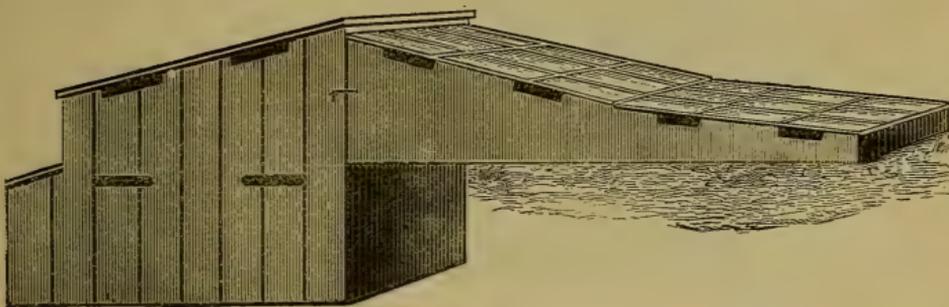
We desire to thank you for the fine display you made with your Incubator at our fair last week. It was the center of attraction for all. The fact that you brought about 400 eggs from Easton with the mercury at zero, packed them in the Incubator and had them hatching the next day, and got a yield of 90 per cent. in fine healthy chickens, is recommendation enough for your machine. Wishing you the success you deserve, we remain, yours truly,

F. L. FISH, Pres. of Southern Mass. Poultry Association.  
PHILANDER WILLIAMS, Vice-Pres. of Southern Mass. Po'ltry Asso'tion.

— — — — —

Send for Circular. Address JAMES RANKIN, South Easton, Mass.

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THE MATRON BROODER!



No more failures in the Poultry busiess on account  
of Inability to Raise Chicks.

THE MOST RELIABLE BROODER ON THE MARKET,

—MANUFACTURED BY—

**PELZ & CO.,**

—DEALERS IN—

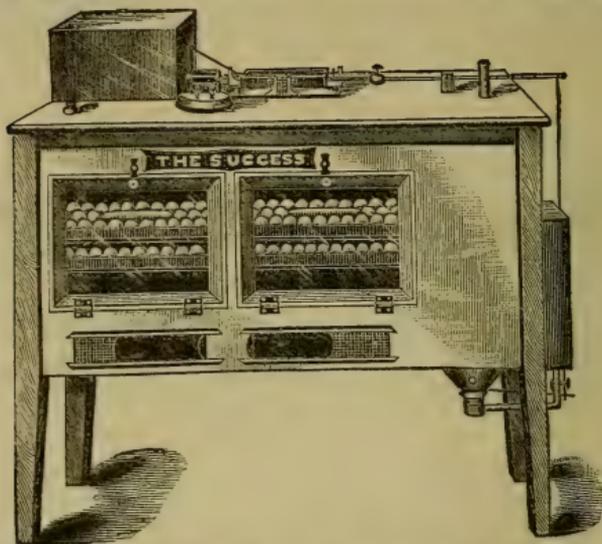
INCUBATORS <sup>AND</sup> POULTRY SUPPLIES

Of every description. All the leading Incubators in constant oper-  
ation at our store. Send for our price list.

103 North Second St.

PHILADELPHIA, PA.

# THE SUCCESS



## HATCHER AND BROODER!

—The "Success" Hatcher now stands Second—  
to None. It is the best

## ELECTRIC REGULATED INCUBATOR!

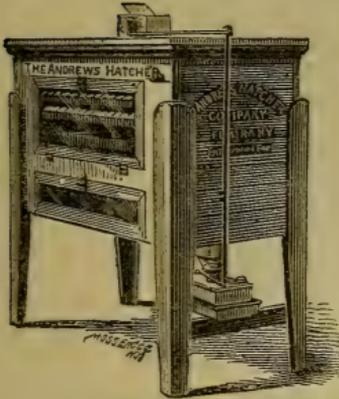
In the world. We make no exceptions. The battery lasts two years without any attention and turns the Lamp Flame down and opens the valve without any complicated clock work. It has extra moisture pans for use in warm weather, saving the trouble of sprinkling the eggs. We are willing to put the "Success" against any Electric Regulated Incubator in the world for \$100.00 cash. Diplomas or Medals not wanted.—

Send for our new circular giving testimonials. It will only cost you a postal card. Address,

THE "SUCCESS HATCHER CO., Lancaster, Pa.

# THE BEST HATCHERS AND BROODERS ON EARTH!

The vexed question at last solved. The long looked for perfection in artificial hatching realized without batteries, springs or clock work. We guarantee the machine to keep the same temperature winter or summer. It requires no Electrician or Engineer. A child can manage it successfully.



## PRICE-LIST OF HATCHERS.

No. 1, 200 Egg Capacity.	-	\$35.00
" 2, 400 "	"	65.00
" 3, 800 "	"	100.00

## PRICE-LIST OF BROODERS.

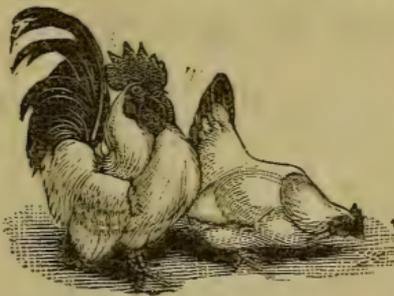
No. 1, 200 Chicks,	-	\$15.00
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" 3, 800 "	-	30.00

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# ◇ FANCY CHICKENS, ◇



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## C. C. WHIPPLE & CO..

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CHICAGO, ILL.

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MANUFACTURER OF



# THE WESTERN INCUBATOR

—And the GROSS Automatic Self-Feeding—

Incubator Lamp,  
Drinking Fountains,  
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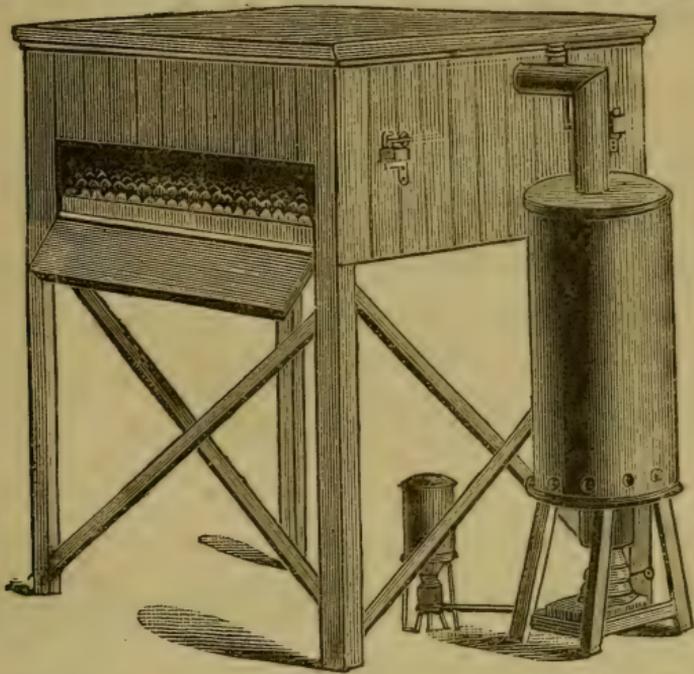
◇ TESTED THERMOMETERS. ◇

Egg Turning Trays and Poultry Breeders' Supplies.

2117 and 2119 State St. Chicago. Ill.

THE BEST MACHINE OUT

**THE AMERICAN INCUBATOR.**



The Incubator above Illustrated embodies in main the principles employed in the construction of the AMERICAN INCUBATOR for the past year. But I have spared no pains or expense of money, thought or labor to improve my machine in every possible way, and to keep fully abreast with the advanced thought of the times.

The American Incubator is offered to the public in full confidence that it meets a long and widely-felt, as well as growing need of poultry raisers, whether producing for the market or simply for fancy.

**PRICES:**

No. 1, holding 150 eggs	-	-	-	\$30 00
" 1, with extra oven	-	-	-	45 00
" 2, holding 250 eggs	-	-	-	35 00
" 2, with extra oven	-	-	-	55 00
" 3, holding 500 eggs	-	-	-	50 00
Brooder capable of containing 100 chicks, complete, with lamp,	-	-	-	6 00

The Incubator, with all its parts, crated for shipment, weighs about 150 pounds; brooder, 60 pounds:

**J. D. SMITH,**

4225 Langley Av., Chicago, Ill.

# C. C. CUSHING,

ST. LOUIS, - MO.

— Breeder of Thoroughbred Pedegree —

**Light Brahmas,  
R. C. White Leghorns,  
Plymouth Rocks and  
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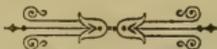
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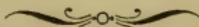
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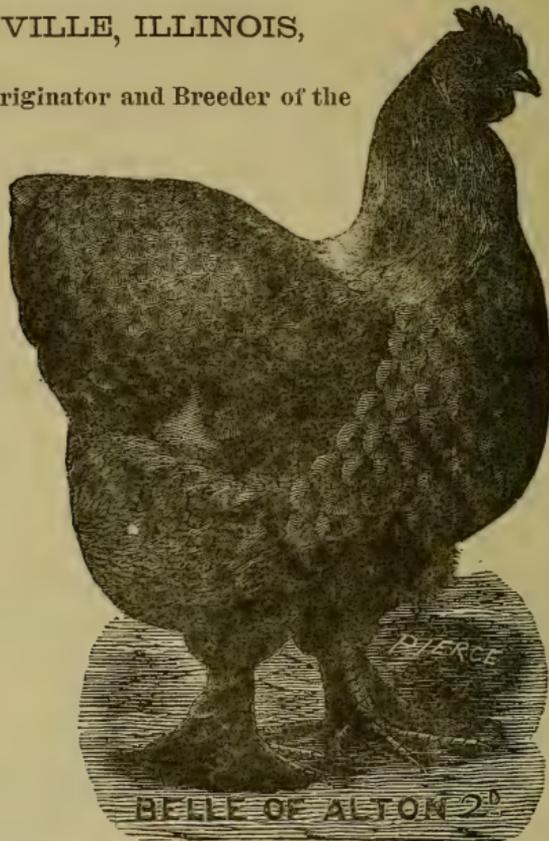
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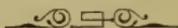
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A TONIC FOOD THAT KEEPS FOWLS HEALTHY, AND  
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It is made of the purest and best materials, and contains the phosphates and iron, etc., that go to form bone, re-invigorates the blood and in every way tone up and strengthen the system. All these ingredients are in such form as to be quickly assimilated by digestion and the good effects are at once visible in the appearance of the fowls. In offering this preparation to the public, the proprietors are aware of the difficulty attending the introduction of an article claiming so much as the "Poultry Food" without the support of undoubted evidence of its value. We have, therefore, taken the liberty to publish a few of the numerous letters received from well-known gentlemen in poultry breeding, who have used it, and whose testimony raises the article above suspicion of any attempt to humbug the people. (These testimonials will be sent to any one who wishes to see them.)

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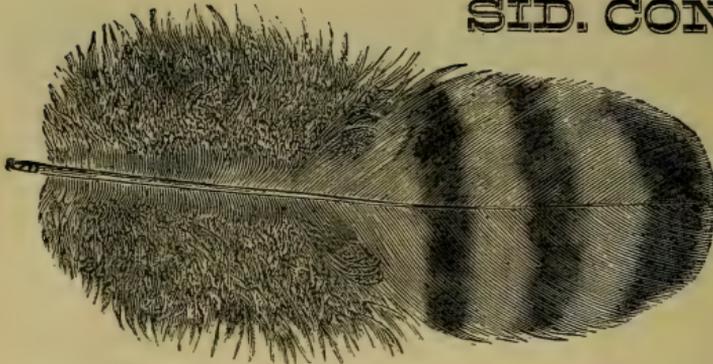
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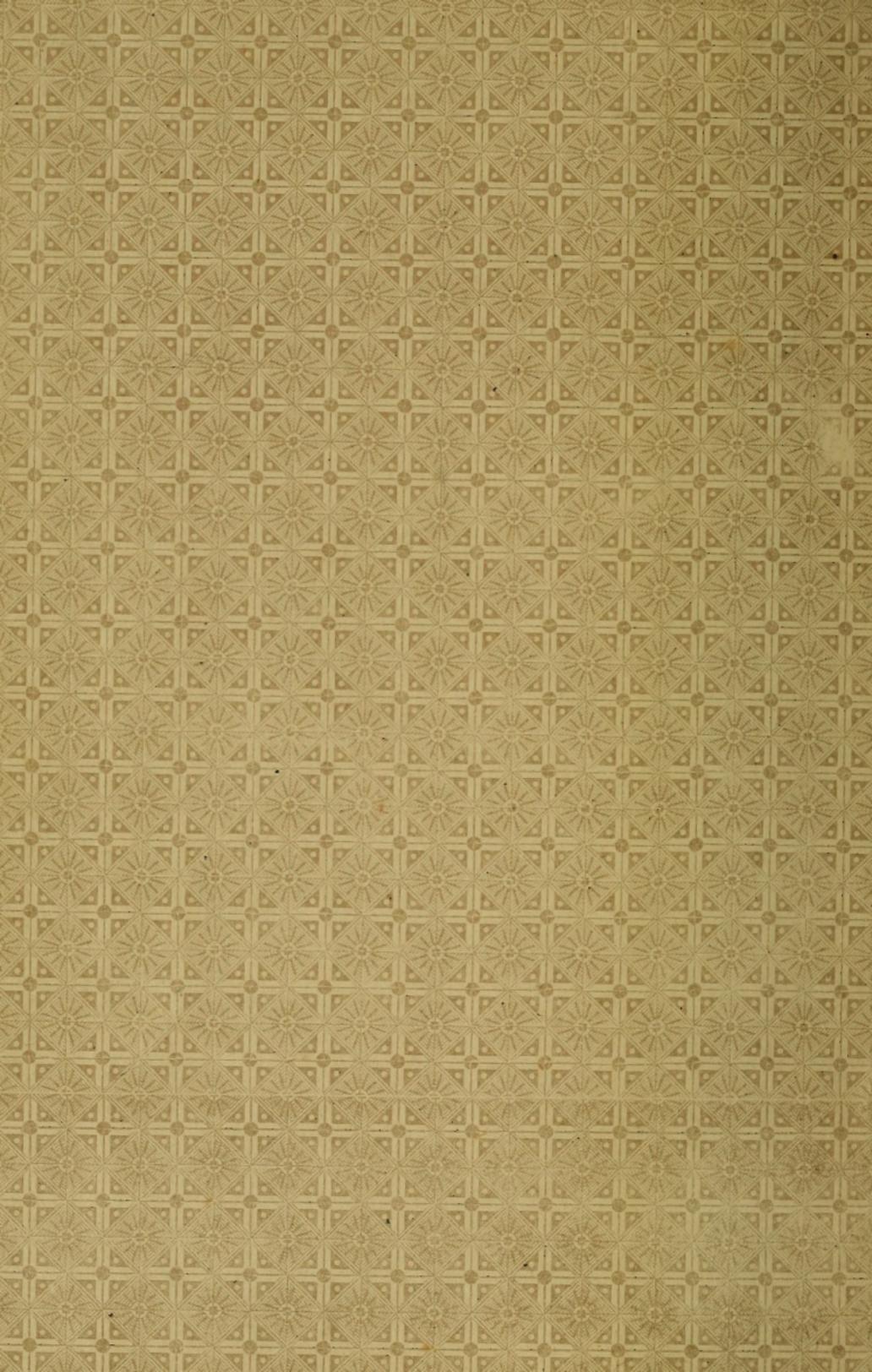


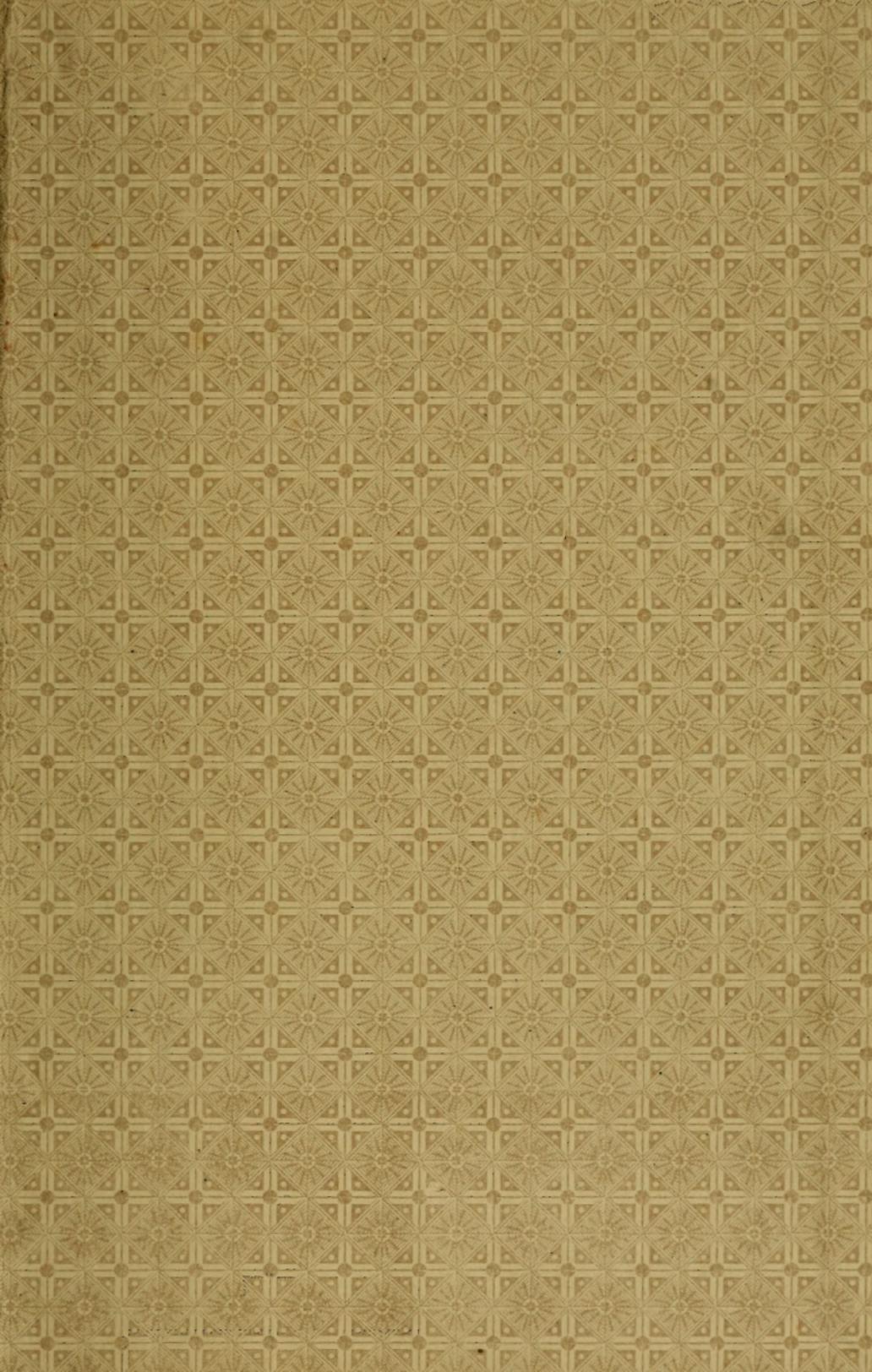












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