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THE PRODUCTION AND CARE OF Hatching Eggs



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The Production and Care of Hatching Eggs

J. H. CLAYBAUGH¹

INTRODUCTION

NEBRASKA POULTRYMEN have an opportunity to increase the average price they receive for eggs by developing an outlet in other states for hatching eggs. Desirable hatching eggs always command a premium above prices paid for market eggs. Several states not far from Nebraska import quantities of hatching eggs. The hatching egg needs of these states offer a potential market for a large number of Nebraska eggs. If Nebraska is to supply these needs, its industry must be properly organized to supply the quality and quantity demanded.

In 1949 the average farm price for eggs was lowest in the North Central States. Within the area, only prices in the Dakotas were lower than those paid in Nebraska. Egg prices in the North Atlantic States averaged 19.5 cents per dozen more than the average price received in Nebraska. There are two reasons for this price spread—the North Atlantic States produce far fewer market eggs than they consume, and they export large numbers of hatching eggs.

TWO TYPES OF POULTRY BREEDING FLOCKS

Breeding flocks that provide replacement pullets for market egg producers. Pullets used as replacements for the commercial egg laying flock should in general be hatched during February, March and early April. These pullets should be mature enough in September to lay eggs that weigh about 2 ounces. Approximately 10 per cent of the hen population can produce enough chicks for replacement of such laying flocks during a three- to four-month hatching period. This factor should be considered when flock owners make agreements to produce hatching eggs. The flock owner who maintains a superior type of breeding flock can reasonably expect the demand for his eggs to continue throughout the hatching season.

Breeding flocks that provide chicks for broiler growers. The demand for hatching eggs to produce chicks for commercial broiler production is less seasonal than that for chicks used in market egg production. The breeding of special strains and the production of hatching eggs to meet the requirements of broiler growers has developed into a specialized industry. Characteristics desired in these breeding flocks are a high rate of lay, a high per cent of hatchability, and the production of high quality hatching eggs. These characteristics are measured by the rate of feathering and growth of the chicks produced, per cent

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of marketable birds from chicks started, ease of dressing and consumer appeal of the final product.

Considerable progress in developing such breeding flocks has already been made in Nebraska.

DISEASE CONTROL

Pullorum eradication. *Salmonella pullorum* (formerly called bacillary white diarrhea) has long been the cause of greater loss of chicks during the first three weeks of brooding than all other diseases. The disease organism is transmitted from the infected adult hen through the egg to the baby chicks. This disease spreads from infected to healthy chicks either in the incubator or in the brooder house. If any infected birds are left in the adult flock the spread of infection continues. A reliable test for detecting adult birds that are carriers of the disease has been developed. By repeated use of this test and removal of all carriers in the flock, and all sources of infection from the farm the disease can be eliminated. While a flock remains free of the pullorum organism its eggs cannot spread the disease.

A supervised program known as The National Poultry Improvement Plan, or N.P.I.P., was started in 1936 with one of its objectives the eradication of pullorum disease from breeding flocks and incubators. This plan established the ratings, procedure and regulations for breeding flocks, hatching eggs and baby chicks that are produced under the supervised program. Since several states have laws or regulations requiring labels and certifications for all hatching eggs and baby chicks imported, the pullorum-clean rating under the N.P.I.P. has become almost a necessity for those who make interstate shipments of hatching eggs.

Those who buy hatching eggs in quantity not only demand that the breeding flocks possess the hereditary characteristics previously mentioned, but also expect a pullorum-clean rating.

The pullorum eradication programs that started in New England during the early twenties aided in building an export market for hatching eggs. The midwest was slow to adopt an eradication program for pullorum but considerable progress has been made during recent years. Those who adopt the recommended program can have reasonable assurance that a pullorum-passed or a clean rating can now be maintained.

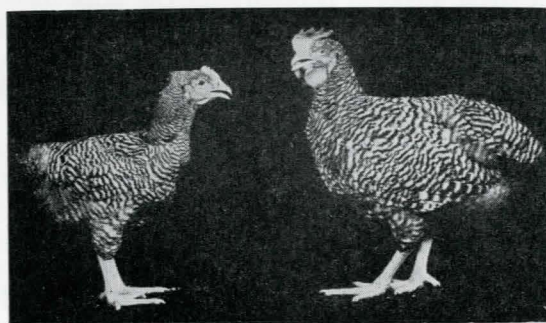
Vaccination. The producer of hatching eggs should take precautions to protect his flock from disease, particularly Newcastle, fowl pox, and laryngotracheitis, as these diseases will either suppress or stop egg production. The hatching quality of the eggs remains low while the hens are recovering from these diseases and complications often arise later. For a number of years vaccines of recognized value have been available which give reasonable immunity to fowl pox and laryngo-

tracheitis. Under conditions where birds are frequently exposed to these diseases pullets should be vaccinated between the ages of 10 and 16 weeks. Vaccination is not considered necessary or desirable in areas where pox and laryngotracheitis do not exist or where birds will not be exposed.

There are several types of Newcastle vaccines on the market. The live-virus vaccine is claimed to give permanent immunity. Since this is a true virus there is danger of introducing the disease into new territory. The killed-type virus does not endanger unvaccinated flocks or other unvaccinated hens on the same farm. Because of disagreement in claims and the limited amount of research that has been conducted, much confusion exists about the true value of either type. Until these uncertain elements are cleared up by research, flock owners seem to be following the leadership of their local hatcherymen.

Management and equipment. Management methods and equipment are important to any health maintenance program. As a rule breeding flocks are larger than those found on the average farm and the flock contributes a larger-than-average per cent of the total gross farm income. The methods and equipment used should be those usually recommended to provide comfort for the hens and labor-saving advantages to the poultryman. As a rule the health of the flock and the hatchability of the eggs can be better controlled where young stock is kept separate from older birds and the flock is kept confined after it has been moved to the laying house.

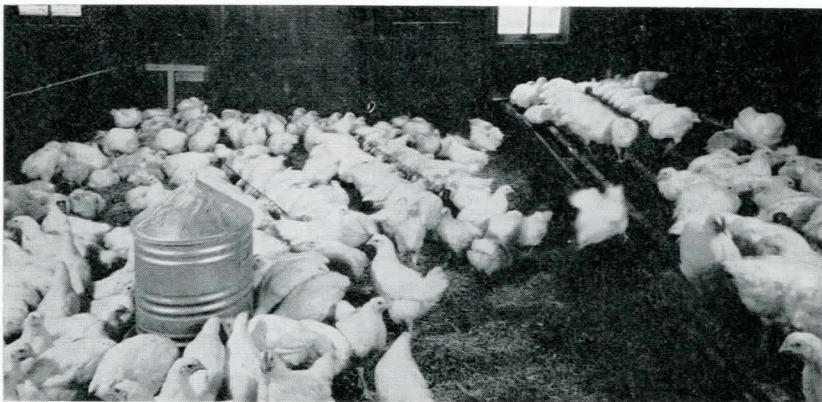
When poultry houses are well enough insulated to prevent the water from freezing, much labor is saved during cold weather. Combs and wattles will not freeze and egg production and hatchability are maintained at a more uniform rate.



Cull

Save

To prevent unevenness in growth of broilers, all runts—both male and female—must be culled from the brood of chicks that is to be kept for breeding purposes.



Pullets are usually moved to summer range when eight to ten weeks of age. Before moving pullets from the brooder house, all slow growing and poorly feathered ones should be sorted out and left for market.

BREEDER FLOCK MANAGEMENT

Feeding the breeding flock. A ration that might give satisfactory results in the production of market eggs may not be adequate for the production of hatching eggs. The diet of the breeding flock is of extreme importance in determining the number and vitality of chicks produced. The carry-over effect of the diet of the parent flock has stimulating effects on the growth of chicks for several weeks. Normal hatchability requires adequate supplies of the required minerals and vitamins. Good shell texture helps prevent breakage and allows uniformity of air cell enlargement during incubation. A number of high vitamin concentrates are now available in pellet form which may be used in small quantities as a teaser feed ² at noon to aid in improving hatchability. Recent research findings and the problems that may arise as a result of them, make it necessary for the flock owner to submit his feed formulas to specialists or depend upon the reliability of a firm whose feed has given satisfactory results. Feeding a good breeder mash combined with grains such as corn, oats, wheat and kafir is the usual procedure.

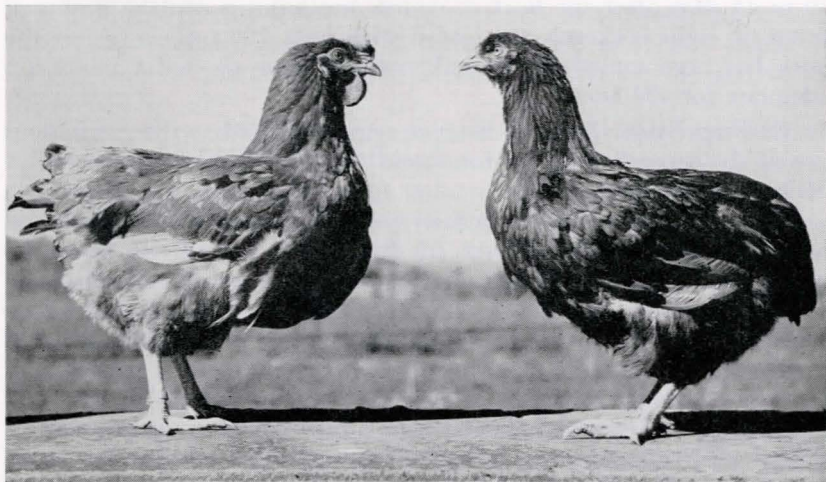
In Nebraska most poultrymen who keep breeding flocks are cooperating with a hatcheryman who culls their flocks and buys the hatching eggs. Hatcherymen who keep flock-owner records of feeding methods and egg hatchability are in a position to assist with feeding problems. Flock owners should keep daily records of feed consumption and number of eggs laid as an aid in solving management problems.

Minimum egg weights and body weights. The minimum weight for hatching eggs during the six months from December 1 to May 31

² A teaser feed is a term used to describe the use of limited quantities of a special appetizing feed which stimulates an increase in feed consumption.

has been established by the N.P.I.P. as 1 11/12 ounces. A 5-pound minimum weight for hens and a 7-pound minimum weight for male birds has been established in Nebraska for all of the dual-purpose breeds. The minimum Leghorn weights are 3½ pounds for pullets and 5 pounds for males.

Source of chicks. Chicks should come from well selected flocks. Key flocks that exceed the minimum requirements for body size, egg size, standard quality egg production and freedom from disease should be established. These flocks become the parent stock of the chicks that go out for future breeding flocks. If a closed breeding flock program is followed, no other poultry should be brought to the farm.



The rugged full-sized pullet, like the one at the left, that shows evidence of having laid well when seven to eight months of age makes a good bird for a breeding flock. The slow developing pullet may be a victim of poor management or infected with disease. Photograph Courtesy *Successful Farming*

Age of breeding flocks. Chicks for breeding flocks are hatched eight to ten months before the beginning of the expected demand for hatching eggs. Eggs from selected strains usually exceed the 1 11/12-ounce minimum weight when the birds are eight months of age, although the mature body weight of the pullets is not attained until about ten months.

The best hatchability records can be expected from pullet flocks after they have reached their mature weight and as egg production increases. Flock owners who accept contracts to deliver hatching eggs throughout the year keep their supply of eggs constant by starting broods of chicks during November, February and May. Eggs from each group of pullets are then used for hatching purposes for a period of five to seven months. The hatchability of pullet eggs is slightly

higher than that of eggs from yearling hens. During the third laying year the reduction in hatchability is significant.

Preliminary selection of the broiler-type chicken. Selection of the large, rugged, broiler-type cockerels should be made before any are disposed of. These selected males may be marked by dubbing or wing banding. Broiler-type cockerels should weigh 2 pounds at eight weeks or 4 pounds at twelve weeks of age. Twice as many cockerels should be selected as will be needed later, so further selection can be made at maturity. Broiler-type pullets should weigh more than 3 pounds at twelve weeks of age.

Ratio of males to females. When hatching eggs are desired within 10 to 14 days after the flock is mated, hatchability will be higher if seven or eight cockerels are mated with each 100 pullets. After the flock has been mated for several weeks, five or six active males are adequate for 100 hens.

Built-up litter. Built-up litter is a term applied to the continuous use of the same floor litter for several broods of chicks or successive flocks of laying hens.

The advantages of built-up litter are (a) savings in labor, (b) savings in cost of additional new litter, (c) drier floors, (d) warmer floors, (e) improved hatchability of eggs, and (f) improved rate of growth.

Ohio investigators report using the same litter for up to ten consecutive broods of chicks. In laying houses litter was used for two and three years.³ The Ohio experiments showed that as the percentage of poultry droppings increased in the litter, the advantages of the litter increased. Owing to bacterial action, built-up litter is a source of special nutritional factors necessary for maximum hatchability when breeding flocks are confined indoors.⁴

Built-up litter is usually started when the pullets are first housed in the fall or when the first brood of chicks is started. Some poultrymen place a thin layer of sand on the floor before adding the litter. Coarsely ground corn cobs, shredded corn stover, shavings, or wheat straw can be used with satisfactory results. For laying hens, the litter should be stirred frequently. When necessary 10 pounds of air-slacked lime may be added for each 100 square feet of floor space to prevent caking. In broiler houses the caked part of the litter can either be removed or permitted to accumulate until the brood is marketed. Some producers feed whole grain in the litter each day so that the hens will keep the litter well stirred, while others prefer feeding all grains in the mash and stirring the litter by mechanical means. Wet areas in the floor litter develop first around the water supply. The

³ Kennard, D. C., and Chamberlin, V. D. "Growth and Mortality of Chickens as Affected by Management of the Floor Litter." Mimeo. Series 3, July 20, 1949. Poultry Science Dept., Ohio Agr. Exp. Sta.

⁴ *Farm and Home Research*, Ohio Agr. Exp. Sta., for January and February, 1947.

litter can be kept drier if watering pans are placed on top of the roosts or on a screened platform similar to roosting racks, or if drains are provided.

A poultry house—particularly the floor—is drier and warmer when deep litter is used. The danger from respiratory diseases which often occur after a hen house is cleaned during cold weather is thus reduced. When uninsulated poultry houses are overcrowded and poorly ventilated, the floor litter becomes wet. Built-up litter may not be practical in the poorer type of poultry houses or where screened-in roosting racks and filth-proof feed troughs are not used.

Effects of temperature on hatchability of eggs. The hatchability of eggs produced during severe cold weather may be reduced by excessive chilling of eggs, by inactivity of males because of frozen combs or wattles, and by the general effect of cold weather on the activity of the birds.

Hatchability of eggs that are laid when the temperature exceeds 80° F. may be reduced 15 to 20 per cent.⁵ This decrease is generally attributed to a weakening of the embryo caused by preincubation development before the eggs are delivered to the hatchery and to the decreased fertility associated with inactive breeding stock during hot weather.

Embryonic mortality increases with the length of time that the eggs are subjected to unfavorable temperatures.

CARE AND HANDLING OF HATCHING EGGS

Hen house management to produce clean eggs. The proper handling of hatching eggs is essentially the same as for high quality market eggs. Avoid spraying or painting roosts and nests with oils that soil egg shells and that can kill embryos. Deep, dry floor litter is a help in keeping egg shells clean. Nests well padded with 3 to 4 inches of highly absorptive litter will prevent egg breakage and take up moisture quickly. Wood shavings or ground cobs combined with hay are satisfactory for nest litter. Frequent gathering of eggs is necessary to avoid the deleterious effects of extreme temperatures or the occurrence of broken and dirty eggs. Gathering eggs two to three times each day also permits more frequent observations of the flock. Broody hens should not be permitted to remain on the nest overnight as they are often responsible for fights which result in broken eggs and dirty litter.

Cleaning dirty eggs when gathered. The hatchability of eggs that are smeared with contents of broken eggs is low. When the shell pores are closed by egg albumen the embryo cannot receive oxygen. Dry cleaning of soiled eggs is preferred to washing. If eggs must be washed, it should be done as soon as possible after they are gathered. The

⁵ Funk, E. M. "Factors Influencing Hatchability in the Domestic Fowl." Missouri Agr. Exp. Sta. Bul. 341, 1934.

wash water should be warmer than the eggs but not over 130° F. Washing dirty eggs, if done properly, does not necessarily affect hatchability. When the water in which the eggs are washed is warmer than the eggs an increase in internal pressure of the eggs prevents the washing solution from penetrating the pores of the shell.

Precooling eggs before packing. To retain the interior quality of eggs it is necessary to gather them in wire baskets several times each day and then take them to a holding room for precooling and casing. Temperature of the holding room should be between 50° and 55° F., and the relative humidity between 80 and 90 per cent. All eggs gathered during the day should be precooled in the wire gathering basket during the night and cased the following morning. The cool eggs should be sorted for the desired size, shape and shell texture as they are packed. The empty cases should be stored in the same holding room long enough for them to become cool and moist before being filled. The eggs are handled once when gathered from the nests, and a second time when they are sorted and packed. The person who handles the eggs must keep his hands clean and dry to prevent soiling the eggs.

Effects of jarring. Egg shells are cracked by multiple handling, rough handling, or overfilling of egg baskets. Either rough handling or age may result in tremulous air cells, that is, the shell membranes become separated over a larger area than is normally occupied by the air cell. Hatchability is lower in eggs with broken or tremulous air cells. However, when eggs are in a vertical position (large end up) when being shaken, the air cells are more likely to remain firm and more normal embryos will develop than when the position of the eggs is reversed.

Delivering eggs each week. Hatcherymen want eggs delivered at least once each week. When eggs are handled and held properly, hatchability can be maintained until they are seven days of age. If eggs are not held longer than seven days, turning is unnecessary.

Packing hatching eggs for shipment. Eggs shipped by either truck or railway express require careful sorting and packing to avoid breakage. Research is being conducted in an effort to find new types of packages that will reduce shipping loss from breakage. Dealers who candle hatching eggs to remove checks and blood spots should also case each size separately. All eggs should meet the standards set by the National Poultry Improvement Plan for size, shell texture and condition of shell.