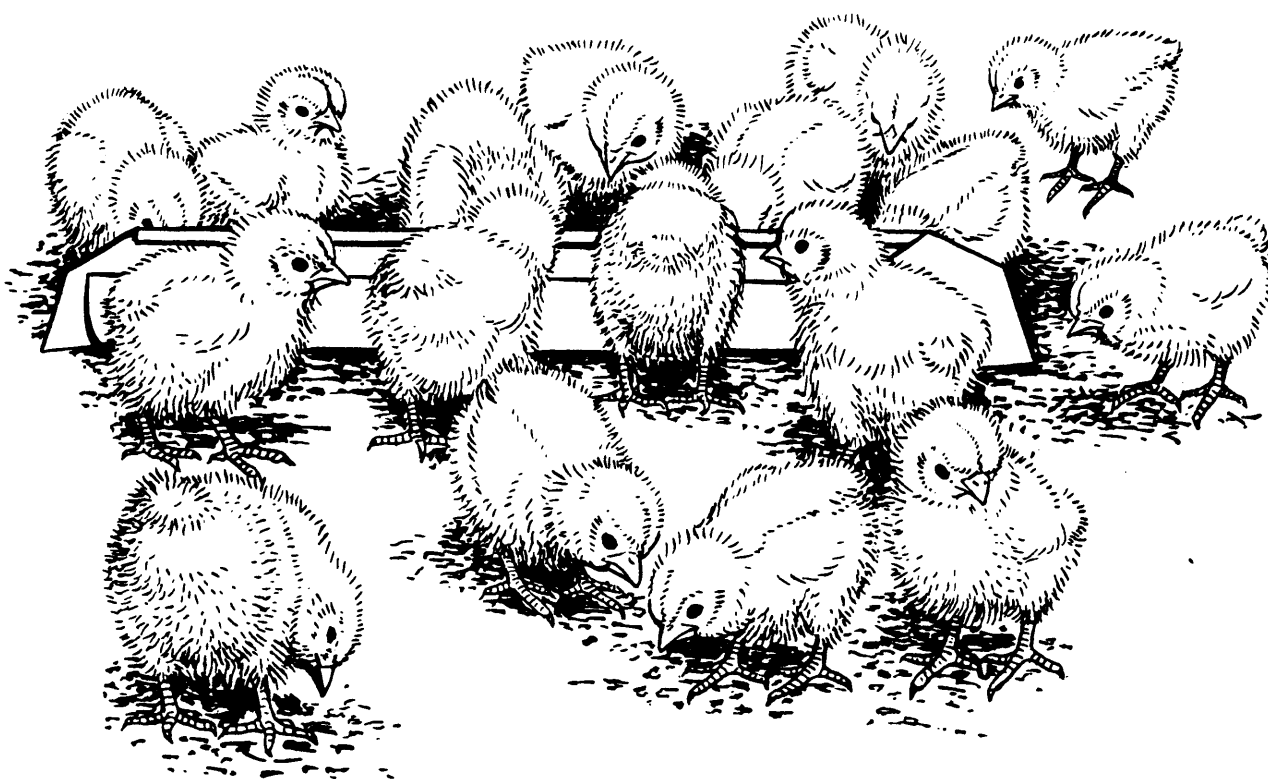


Brooding Chicks



Extension Circular 854
Revised June 1983



OREGON STATE UNIVERSITY EXTENSION SERVICE

Chicks grown commercially for either meat or egg production are brooded artificially. Many smaller producers, hobbyists, and fanciers also use artificial brooders to raise their chickens. Natural brooding was commonplace until the 1930's; however, today it is most unusual to see a mother hen with her brood of chicks. The brooding period is usually considered to extend from the time the chicks hatch, or are received from the hatchery, until they are about 6 to 8 weeks old.

Good brooding and rearing practices bring out the good qualities inherited by chicks, whereas poor brooding practices can ruin chicks of the best breeding. Success in brooding pullets for layers is indicated by a uniform flock of fast-growing, well-feathered, healthy pullets. Success in brooding broilers results in rapid and uniform growth, good efficiency of feed use, fast feathering, and a low rate of mortality.

Start with healthy chicks

Purchase only day-old chicks from a reliable hatchery, one that follows a good disease-control program and has a good local reputation. To avoid possible exposure of chicks to diseased fowls in transit, many hatcheries deliver chicks, especially when the number ordered is relatively large. With smaller orders, you may have to go to the hatchery for chicks. In some cases, chicks of the more uncommon or exotic breeds may not be available locally and must be shipped considerable distances. In obtaining these breeds, day-old chicks are much less of a disease risk than older or "started" chicks.

To avoid pullorum or typhoid disease, obtain chicks from hatcheries meeting specific requirements of the U.S. Department of Agriculture and the Oregon Department of Agriculture. A list of such hatcheries is available from the latter.

Purchase chicks bred for the job

If it's eggs you want, select a strain or stock that has high egg production, low mortality rate, relatively small body size, and lays large eggs of good quality. There are more good egg-production strains of White Leghorns than any other breed. Since Leghorns lay white-shelled eggs, persons demanding brown-shelled eggs may obtain reasonably good egg production with some of the egg-strains of Rhode Island Reds or Plymouth Rocks. Some of the large organizations breeding chickens for commercial egg production have developed brown-egg chickens that lay well with body size similar to commercial Leghorns. With egg-type chickens, sexed pullet chicks are preferred since it is usually not profitable to raise the males for broilers or fryers.

If it is meat you want, select broiler or meat stock that grows rapidly and becomes covered with predominantly white feathers in a hurry. Most broiler-type chicks are breed crosses, with the Plymouth Rock and Cornish breeds often involved.

There are no breeds that are efficient on a commercial scale for both meat and egg production, although such breeds as Plymouth Rocks, Rhode Islands, New Hampshires, and Wyandottes are often referred to as "dual-purpose."

The performance of either egg- or meat-type stocks of other poultry producers in your area is a good basis for choosing a certain stock or strain for your own use.

Start chicks at the right time

Large-quantity egg producers may start several broods of chicks a year, starting chicks as often as monthly or bimonthly. With the right equipment and suitable housing, chicks started at any time of year will develop into profitable egg producers. Small producers, 4-H members, and hobbyists may desire to brood only one or two flocks a year. In this case, start the chicks between February 1 and April 15 for best results.

Regardless of the date of hatching, it is normal for hens to molt in the fall of their second year—the usual period being from October to December. Normally hens do not lay during the molting period. Thus, chicks hatched early in the year (January to March) will commence laying when about 6 months old and will produce eggs for 13 to 15 months before the annual molt. Chicks hatched in May or June may lay for only 8 to 10 months. Also chicks hatched early in the year will be as much as 2 to 3 weeks younger in age when they start to lay. Broiler chicks are brooded successfully at any season; however, there is reduced market demand for them just before Thanksgiving and Christmas.

You should place your chick orders with the hatchery well in advance to insure getting your chicks at the desired time.

Provide adequate housing

Since most chickens reared today are confined, comfortable and roomy housing is essential. Chicks are artificially brooded successfully by the following methods:

1. under brooders and on litter on the house or pen floor,
2. in battery brooder units, and
3. in wire cages in houses with controlled temperature and ventilation.

Regardless of the method used, the house and equipment should be cleaned thoroughly and dried out before the arrival of the chicks.

Set up the brooders and start operating them several days before the chicks arrive. This will reveal any missing or malfunctioning parts, permit temperature adjustment, and help to remove moisture from the house or litter.

Temperature

The required heat for the chicks may be supplied by natural or "bottled" gas or electricity. Gas is a reliable

and relatively inexpensive source of heat. Electric brooders are easy to regulate, but electric power is now quite expensive. The source must be dependable since a power failure could be disastrous. Kerosene, coal, briquets, and wood were once common fuels for brooding.

When the chicks are day-old, the temperature should be from 90 to 95°F *at the level of the chicks* on the floor. The temperature is usually lowered about 5 to 6° each week until a temperature of 70 to 75° is reached or until the chicks are 6 to 8 weeks old and fully feathered. A reliable thermometer and observing the actions of the chicks will enable you to provide comfortable temperatures.

If the chicks huddle or crowd together and cheep, they are too cold (figure 1). If they move away from the source of heat or from underneath the brooder, pant and hold their wings away from their bodies, they are too warm. Chilling chicks may result in their piling and smothering. Too-cool temperatures also cause diarrhea and increase susceptibility to infectious diseases. Too-high temperatures result in reduced appetite and retarded growth. Body temperatures above 117° will kill chickens.

Brooder guards of corrugated cardboard or cloth-covered wire 14 to 18 inches high and 1 to 3 feet from the edge of the brooder will confine the chicks to the brooding area and prevent floor drafts (figure 2). A small 7½- or 10-watt attraction light under the brooder will also tend to keep chicks from straying away and becoming chilled.

Space requirements

Each broiler chick should have ¾ to 1 sq ft of floor space. Each Leghorn pullet chick to be reared to laying age should have from 1½ to 2 sq ft, and heavy-breed layer replacements 2½ to 3 sq ft.

The amount of space required under the brooder (or hover) will vary from 7 to 10 sq in per chick. More space is required under electric brooders than with those using other types of heat, and more brooder space may be required during cold than during mild weather. As a general rule, place no more than 500 chicks under each individual brooder or hover, regardless of size.

Feeding equipment

Feeder space varies with the age of the chicks. With regular trough-type feeders, chicks should have 1 lineal inch of feeder space to two weeks of age, 2 inches from 3 to 6 weeks, and 3 inches after 7 weeks. In figuring feeder space, remember that chicks eat from both sides of a feeder; thus, a feeder 4 feet long provides 96 inches of feeder space and is adequate in size for as many as 100 day-old chicks. Also, as the chicks grow older, increase the width and depth of the feeders (or feed capacity). Feed is wasted when the feeders are too small. Figure 3 shows different sizes of chick feeders.

Often chicks are fed the first 4 or 5 days with chick-box lids or cut-down chick boxes, especially when

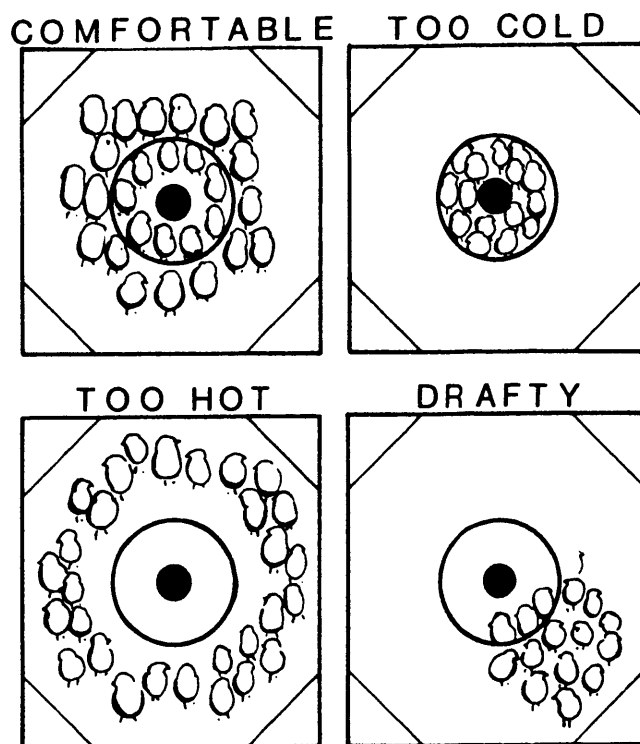


Figure 1.—Chicks will “tell” you when they are comfortable.

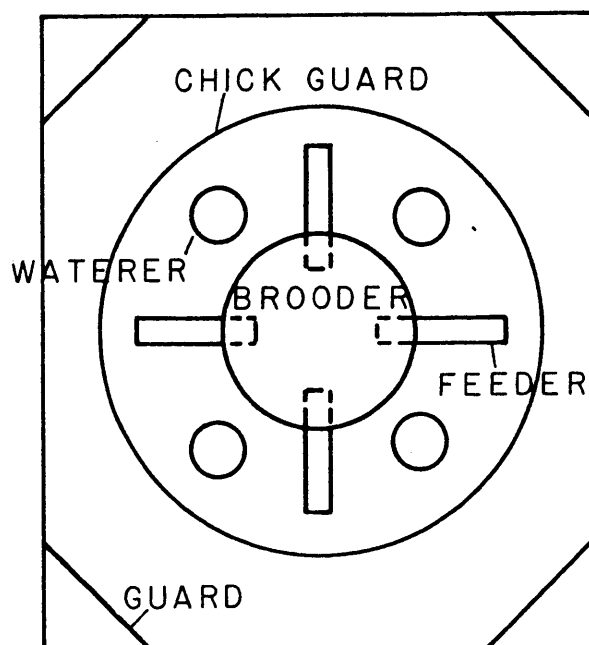


Figure 2.—Place food and water close enough that chicks do not move too far from heat source.

mechanical or hanging circular feeders are used later. With mechanical feeders, allow 2 inches of feeder space per chick, and with 15-inch diameter hanging feeders, provide 15 to 20 for each 1,000 chicks, or two for each 100. With round feeders and waterers, about half the space recommended for straight troughs is required.

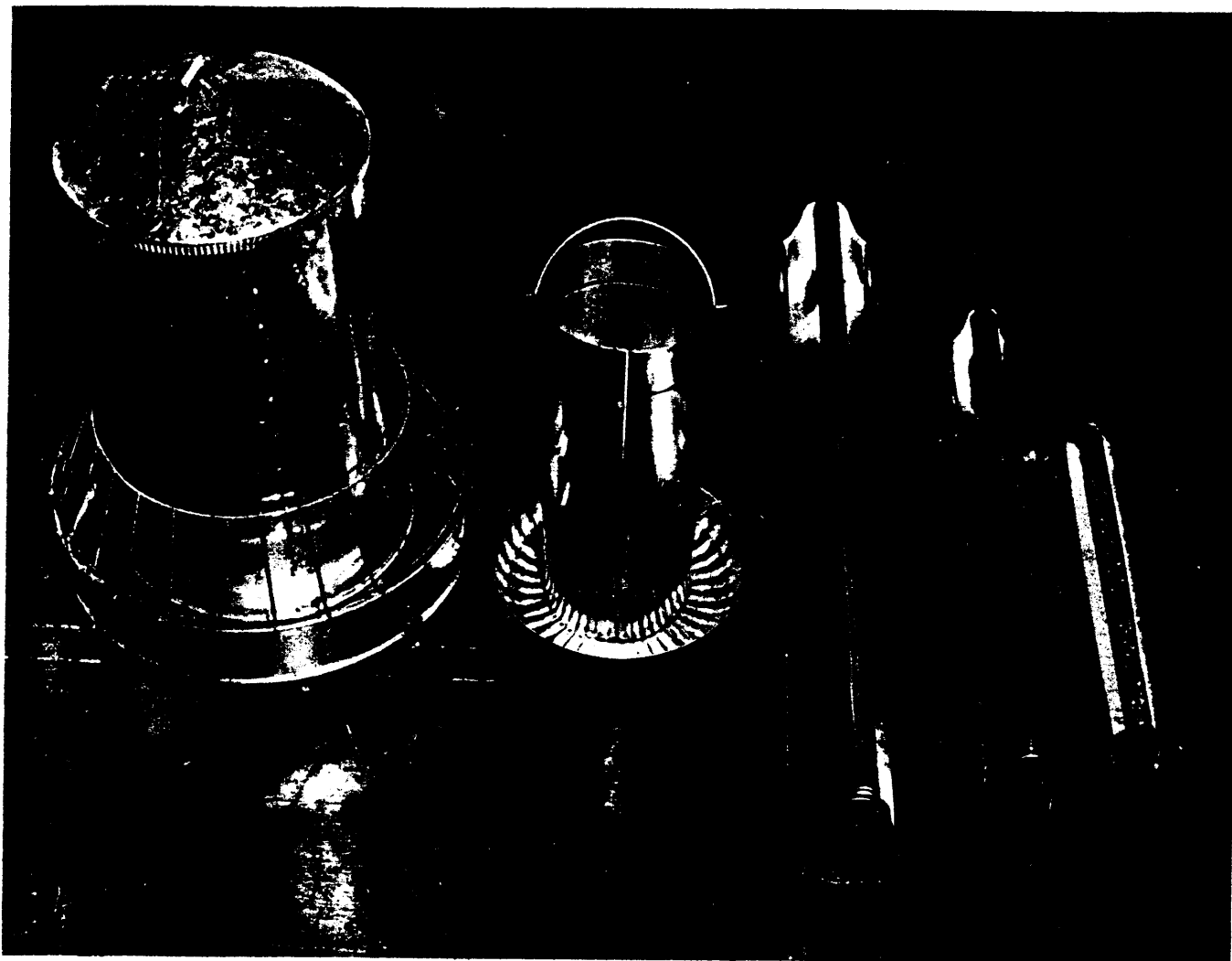


Figure 3.—As chicks grow, they require more space at the feeder. A poultry operation will require several types and sizes of feeders.

Waterers

Provide a 1-gallon waterer for each 50 to 100 chicks the first two weeks (figure 4). With trough-type waterers that allow chicks to drink from both sides, allow 20 lineal inches of trough per 100 chicks during the first 2 weeks and at least 30 lineal inches after 2 weeks. Three 8-foot automatic waterers would be adequate for each 1,000 chicks. Change gradually from baby chick waterers to automatic waterers. Arrange waterers so that chicks do not have to move more than 15 feet for water.

Roosts

When the layer chicks have reached 4 to 6 weeks of age, provide about 4 to 6 inches of roost space. The roost may be 2 x 2 or 2 x 3 inch lumber spaced 12 to 14 inches apart with the sharp corners removed. To encourage early roosting, the brooder may be moved near or partially suspended over the roosts. Broiler chicks should not have roosts as they may develop crooked breast bones or breast blisters.

Litter

Have 2 to 4 inches of dry litter on the floor at the start. Later increase depth to 4 to 6 inches. Materials used for litter ideally should be clean, mold-free, and absorbent. Those that do not pack readily have less tendency for dampness. Wood planer shavings, sawdust, peat moss, chopped straw, cane pulp, and crushed corn cobs are satisfactory. Because of the increasing scarcity and costs of litter materials, many chicks are being reared on welded wire or slat floors.

Brooding more than one brood of chicks on the same litter is sometimes done. When litter is reused, the previous brood should have been free from infectious diseases. Worms and other internal parasites are more apt to be a problem on old reused litter.

Lights

Many gas-burning brooders provide enough light so that additional light is unnecessary. With other types of brooders, suspend a small 7½- or 10-watt incandescent

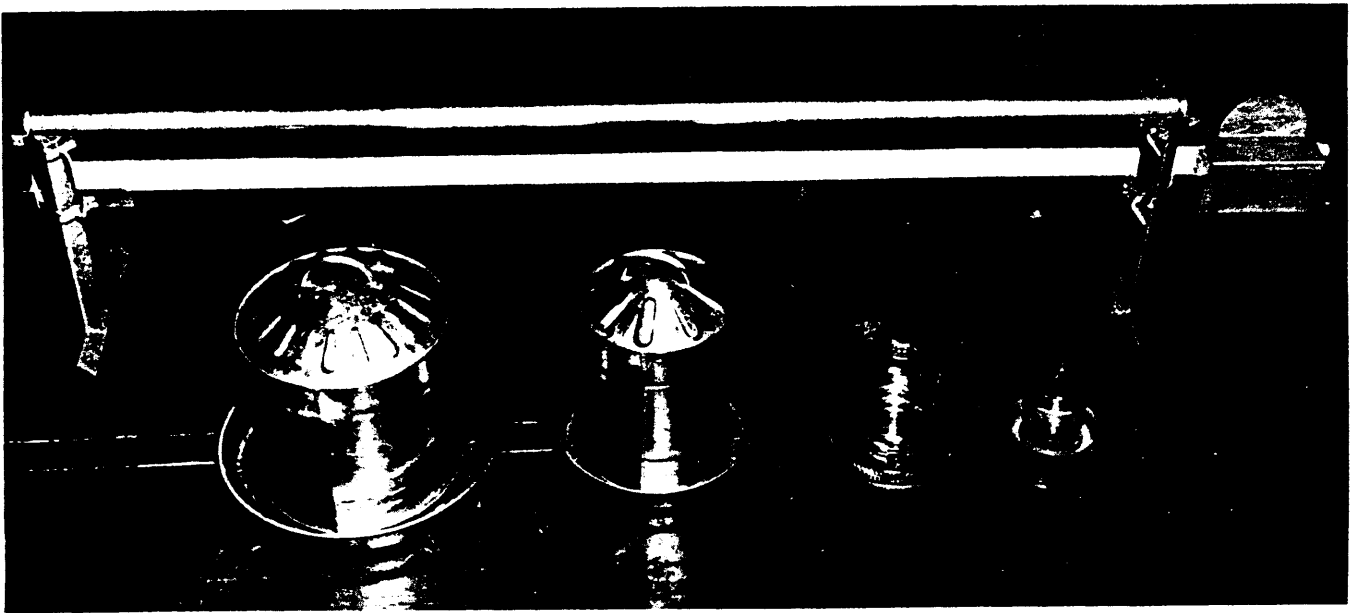


Figure 4. — One-gallon waterers are generally used for day-old chicks. These are replaced with larger waterers as the chicks grow.

light under the hover to attract chicks. Also, many poultry producers provide room or pen lights all night for the first 2 or 3 days, after which no artificial room lights are required unless special light-control programs are employed. Some commercial broiler growers use 24 hours of daily light for the first 4 to 6 weeks or until the broilers reach market weights. Controlled lighting programs for layer-replacement pullets will be discussed in a later section.

Ventilation

Ventilation is required to provide fresh air for the chicks, to remove carbon dioxide and carbon monoxide, to remove ammonia and other fumes, and to aid in keeping the litter dry. Gas, oil, and other "flame-type" brooders that burn the oxygen out of the air require more ventilation. A good ventilating system provides plenty of fresh air without drafts. Chicks huddling in certain areas or spots may indicate floor drafts. A strong ammonia odor means that there is not enough air movement. If the floor litter is relatively dry and the air in the house has little or no ammonia or other odors, the ventilation is adequate.

Ranges for layer chicks

Before about 1950, most layer and breeder replacement chicks were reared on range or pasture, but since that time fewer pullets have been reared on range each year. More knowledge about chickens' nutritional and environmental requirements and increasing cost of suitable land for range are factors contributing to the dwindling numbers of chicks that are range-reared.

There is little doubt that fresh air, sunshine, and green feed are good for chicks; however, we are now able to rear high-quality pullets in complete confinement.

Chicks brooded in portable colony brooder houses during the warmer part of the year may be turned outside when only 1 to 2 weeks old. A gently sloping and wide runway from the brooder-house opening to the ground is necessary. Use poultry netting to confine the chicks to a small area near the house opening for the first few days. With this system, 50 to 100 percent more pullets can be reared on the same amount of floor space normally required for confinement rearing.

In another system of range rearing, the pullets are raised in larger stationary brooder houses until they are 8 to 10 weeks of age, at which time they are moved to shelters on range (figure 5). The pullets may be moved to range in late afternoon and confined to the range shelter overnight. If moved earlier in the day, they may be kept in the shelter a few hours before they are allowed outside. Moving some of the feeders and waterers used in the brooder house along with the pullets will make the change less of a stress. Pullets should not be moved to range during cold or rainy weather; consequently, this system also is suitable only for chicks hatched in the late winter or spring.

The number of chickens per acre on good range will vary from 250 to 400, depending on fertility of the soil and irrigation. Chicks should not be put on ranges occupied by poultry the previous year, and a rotation plan using an area for a poultry range every third year is even better.

The range shelters, feeders, and waterers should be constructed on skids, or otherwise portable, so they can

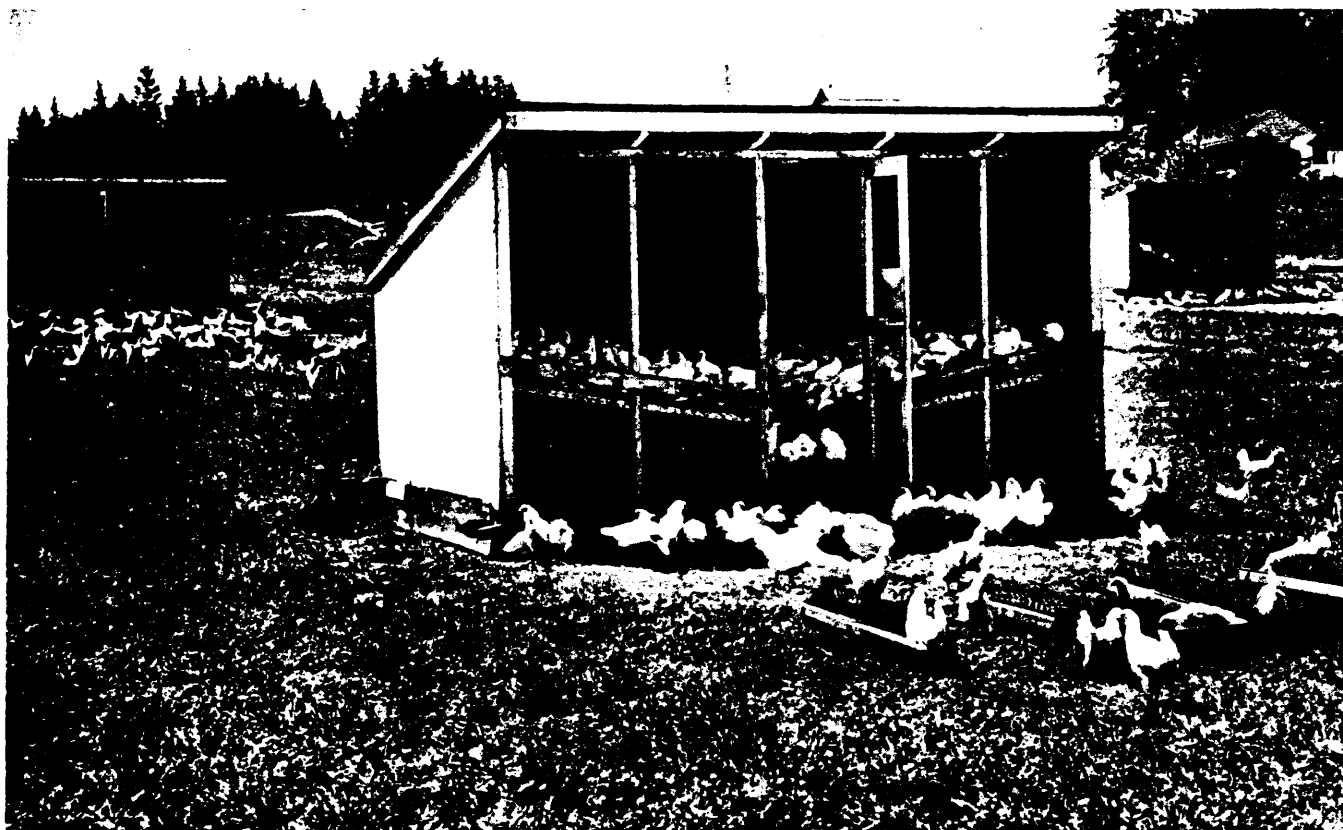


Figure 5.—Portable range shelters are built on skids so they can be moved frequently to new locations, reducing contamination.

be moved periodically to avoid excessive soil contamination and to provide better green feed for the chickens. It is very important that nests be attached to the side of the range shelter to accommodate any early maturing pullets that start laying before being moved to their laying quarters. Pullets that lay on the ground on range are hard to train to lay in nests in the laying house.

Battery brooders

Battery brooders of several makes are available. Generally, the starting units, illustrated in figure 6, are equipped with their own electric heaters. As the chicks grow, they require more space. Since this space is not available in starting units that are filled to capacity, the chicks are transferred to intermediate and later to finishing battery brooders. These units are progressively larger in their dimensions and have no heating equipment, which reduces their cost considerably.

The day-old chicks are placed in starting units where they should have a minimum of 10 sq in of floor space each. Because of their growth it is necessary to allow the chicks more space at 2-week periods. The minimum floor space for each chick in batteries should be increased for each 2-week interval by 10 to 15 sq in. Each chick carried beyond the eighth week should have a



Figure 6.—Battery brooders are sometimes used to start day-old chicks.

minimum of 60 sq in of floor space. Chicks reared to 8 to 9 weeks of age or to broiler weights will require battery-floor space equal to that of six starting batteries.

Chicks may be put in batteries for the first week or 10 days before being transferred to floor brooding. Since chicks may not build up immunity to coccidiosis on wire floors, they are more susceptible to the disease and should have a coccidiostat in their feed after being transferred to floors with litter.

Chicks raised to weights exceeding 3 pounds in batteries are prone to have breast blisters. Broilers grown in batteries with plastic or plastic-coated-wire floors, or on wire floors covered with plastic mats, have fewer breast blisters than those on wire floors. Rearing broilers in coops (stacked in battery fashion) in which they can be delivered to the processing plant has labor-saving appeal.

It is important to house battery equipment in well-insulated buildings constructed to give the operator maximum control over temperature, ventilation, light, and humidity.

Wire-cage brooding

Pullets for commercial caged-layer operations are successfully reared in welded-wire cages (figure 7). Sizes of cages vary, the popular sizes being 12 x 20, 24 x 22, and 24 x 24 inches. If one type of cage is used throughout the brooding period, it is usually made of 1

x 1 inch welded wire. When the chicks are small, the floors may be covered with paper for the first few days. With two-stage rearing programs, the cages used the first 7 to 8 weeks may have floors of 1/4-inch hardware cloth. Cages for older chicks may have floors of 1 x 1 inch or 1 x 2 inch wire. For Leghorns the square inches of floor space per chick is approximately 20 to 30 the first 7 to 8 weeks and 45 to 55 from then to 18 weeks of age. Separate buildings are sometimes used for the 1- to 8-week starter period and for the 9- to 18-week growing period. Heavy breeds will require about 25 percent more space. Some growers floor-brood chicks on litter the first 7 or 8 weeks and then transfer them to wire growing cages.

In wire cage brooding the entire building is heated. For day-old chicks the house temperature should be 85 to 90° and lowered about 5 to 7° per week until 70 or 75° is reached or until chicks no longer require auxiliary heat.

Brooding with heat lamps

When an occasional small number of chicks is to be brooded, and the initial cost of the usual brooding equipment is not justified, infrared heat lamps may be used (figure 8). The two sizes usually available are 125- and 250-watt. The pyrex or red-colored lamps are more expensive initially, but are less apt to burn out. Suspend the lamps *securely* 15 to 18 inches from the floor. They

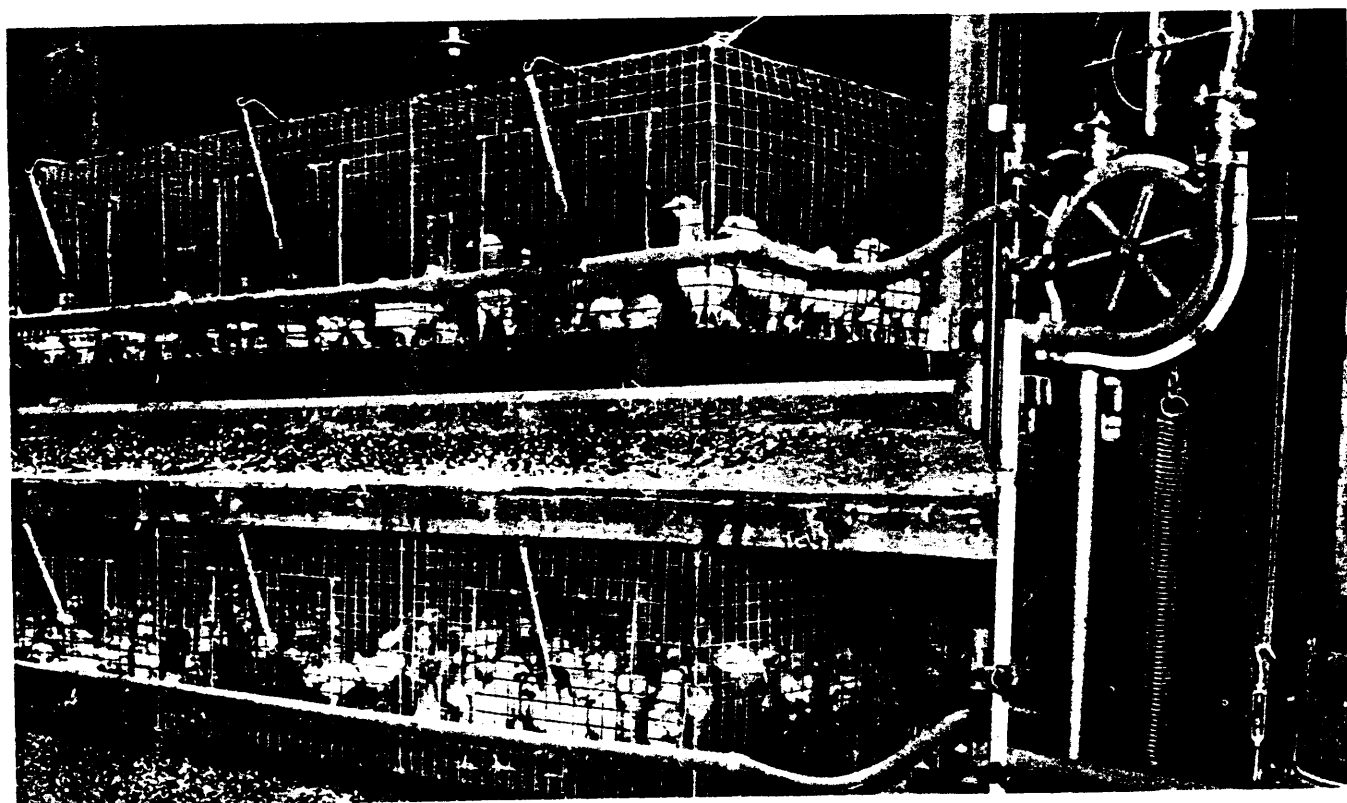


Figure 7.—Chicks being brooded in wire cages.



Figure 8.—Infrared heat lamps are often used to brood small numbers of chicks.

are a fire hazard if they come in contact with litter, paper, wood, or other flammable materials. One lamp will accommodate from 50 to 75 chicks. As a protection against a lamp burning out, it is safest to use at least two lamps. As heat lamps do not protect chicks against floor drafts, it is recommended that a chick guard or some other enclosure be used.

Electric incandescent light bulbs, preferably with reflectors, can be used in brooding small lots of chicks in the garage or other outside buildings in warm weather. This type of brooding is recommended only for emergency situations involving small lots of chicks.

Lighting programs for layer chicks

Increasing day length stimulates, whereas decreasing day length inhibits, the development of the reproductive organs and the onset of egg laying. Pullets hatched in late winter or spring and that reach egg-laying age in the late summer or fall, when day length is decreasing, will attain their mature size before egg laying commences. Natural lighting is satisfactory for these pullets. On the other hand, pullets that are hatched in the fall and attain laying age in March, April, or May may be stimulated into laying before they are physically mature, resulting in undersized eggs. Some system of controlling day length is highly desirable for these pullets. Generally, the objective of such programs is to

not increase day length to which pullets are exposed from 10 to 20 weeks of age.

Producers with lightproof, windowless rearing houses may expose the pullet chicks to 6 or 8 hours of daily light until they are physically mature. After the pullets are about 20 weeks of age, they may be exposed to a constant 13 to 14 hours day length throughout the laying year, or they may be exposed to progressive increases in day length during the laying period. This latter program is often referred to as "Stimulighting." Either the constant or increasing day length programs during the egg-laying period will give satisfactory results.

When lightproof rearing houses are not available, fall- and winter-hatched pullets may be subjected to a constant day length of 15 to 16 hours (natural + artificial light) during the developing period. Another more complicated system for developing pullets in open housing is the "Step-Down Program," in which the day-lengths are decreased about 15 minutes at weekly intervals from time of hatching to maturity. For example, if the pullets were expected to reach maturity (about 20 weeks) in May when day length is 15 hours, it would be necessary to provide 20 hours of daylight at one day of age. In 20 weeks the day length would be decreased 5 hours at 15 minutes per week.

Chick rations

Commercially mixed broiler, chick starter, and developer rations are generally available, and when used they should be fed according to the manufacturer's recommendations. Both chicken broiler and layer-replacement chicks may be fed a broiler ration at the start. Replacement chicks should be changed to a developer ration at about 6 weeks of age, whereas broiler chicks may be continued on the same broiler ration or changed to a less expensive, lower-protein-content broiler-finisher ration at 4 to 6 weeks of age. All the above rations may be available in mash, crumble, or pellet form. Chicks fed crumbles or pellets may eat more feed and grow at a little faster rate; however, these forms are more expensive than mash. Suggested protein needs are listed in table 1.

Table 1.—Protein recommendations in poultry feed

Chickens	Percent protein recommended		
	Starting ration	Growing ration	Laying and breeding ration
Broilers			
0-6	21-23	—	—
6-9 weeks	—	20	—
Pullets			
0-6 weeks	20	—	—
6-14 weeks	—	16	—
14-20 weeks	—	12	—
Over 20 weeks	—	—	15

Table 2.—General formulas for home mixes^a

	lbs/100 lb/mix ^b		
	Starter	Grower	Layer
Coarsely ground grain (<i>corn, milo, barley, oats, wheat, rice, etc.</i>)	46	50	53.5
Wheat bran, mill feed, rice bran, milling by-products, etc.	10	18	17
Soybean meal, peanut meal, cottonseed meal, sunflower meal, safflower meal, sesame meal, etc. (<i>Soybean meal is the preferred protein source. Cottonseed meal should be egg-tested type low in gossypol.</i>)	29.5	16.5	15
Meat meal, fish meal (<i>If meat meal or fish meal is unavailable, soybean meal may be substituted.</i>)	5	5	3
Alfalfa meal (<i>Can be eliminated if fresh pasture is available.</i>)	4	4	4
Yeast, milk powder (<i>Can be eliminated if the vitamin supplement is properly balanced.</i>)	2	2	2
Vitamin supplement (<i>You must supply 200,000 I.U. vitamin A, 80,000 I.C.U. vitamin D₃, 100 mg riboflavin.</i>)	+	+	+
Salt with trace minerals (<i>Trace mineral salt or iodized salt supplemented with ½ oz of manganese sulfate and ½ oz of zinc oxide.</i>)	0.5	0.5	0.5
Bone meal, defluorinated dicalcium phosphate	2	2	2
Ground limestone, marble, oyster shells (<i>Oyster shell and grit should be fed free-choice to layers.</i>)	1	2	2

^a From University of California Extension Service Leaflet 2919, *Feeding Chickens* (1976).

^b Use a combination of ingredients in each category, if possible.

Some producers may mix their own rations and wish to use recommended formulas (see table 2). Since chick starter, broiler, and developer mash formulas are subject to periodic revision, they are not included in this circular, but may be obtained in leaflet form upon request from the Department of Poultry Science, Oregon State University, Corvallis 97331.

Feed should be available to the chicks at all times. However, to avoid waste do not fill trough-type feeders more than two-thirds full; one-half full is better. A wire grill, a reel, or some other device to keep chicks out of the feeders will reduce wastage and contamination of the feed. It is a good practice to let the chicks eat all feed out of the trough occasionally to assure fresh feed. Stale feed in the trough may be unpalatable. On the other hand, do not permit the feeder to remain empty very long or an outbreak of feather picking or cannibalism may be provoked.

Cannibalism

The various causes of cannibalism are not well understood. No simple, positive remedy is yet known. It is known, however, that properly fed chicks, housed in good brooder houses providing ample room per chick, as well as correct brooder and room temperatures, generally give less cannibalistic trouble than those improperly handled. Some factors often associated with feather picking and cannibalism are too intense light, feeding the ration in pellet or crumble form, insufficient protein in the ration, and too little floor and feeder space. Other factors that may aggravate the prob-

lem are curiosity and habit, overheating, and poor ventilation.

The most effective way of controlling cannibalism in young chicks is beak trimming, which is the cutting off of one-third to one-half of the beak. Chicks may be trimmed when day-old at the hatchery or in the brooder house when 3 to 5 weeks of age. Cannibalism in layer-replacement pullets that are 8 to 10 weeks of age or older may be controlled with aluminum or plastic "specs" or blinders. When an outbreak occurs, it is necessary to remove immediately the weak or picked chicks from the flock. Applying antipick paste to some of the flock and darkening the pens are two less effective cannibalism-control measures.

Health program

As already pointed out, both disease-free chicks and sanitary quarters are necessary for successful brooding. The importance of "clean" chicks and a clean house and equipment cannot be overemphasized. Also it is highly desirable to maintain as much "isolation" of the chicks from adult stock and older chicks as is practical. This is of extreme importance in large commercial operations, and it is recommended that brooder houses be at least 300 feet from any adult fowls whenever possible. Chicks are more susceptible to certain diseases carried by older fowls, including Marek's disease and leukosis, during the first 6 to 8 weeks of their lives. Also, routines that reduce or eliminate traffic from older fowls to the young chicks are to be encouraged.

Other practices to guard the health of your chicks are as follows:

1. Do not brood chicks of different ages or from different sources in the same pen, or even in the same house if possible.
2. Do not bring "outside" chickens other than baby chicks on the premises. If it is absolutely necessary to bring in older chickens, keep them in quarantine for an adequate period of time.
3. Do not be too "hospitable" to visiting poultry producers, as they may be carriers of disease organisms.
4. Screen out rodents and wild birds for the same reason.
5. When a disease hits or is suspected, get a reliable diagnosis from a diagnostic laboratory or a competent veterinarian as soon as possible. Some experienced servicemen with breeder hatcheries and feed companies can often help with the more easy-to-identify diseases.
6. Do not treat chicks until you know their ailment. Many medicines are expensive, and also there is the possibility that the wrong treatment may increase your losses.
7. Dispose of dead chicks quickly in an incinerator or a disposal pit.
8. Follow the manufacturer's recommendation in any vaccination program.
9. Do not subject your chicks to more stresses at one time than is necessary. For example, vaccinating chicks for pox, beak trimming, and change from floor litter to wire cages at the same time would be three or more stress factors. Some very vigorous chicks could take such treatment, whereas with other chicks costly losses could result.

BROODING GUIDE for chickens, turkeys, and pheasants

Age	Floor space	Feeder space	Water space	Ventilation-room temp.	Management practices
1st week	1 sq. ft. (929 cm ²) per chick	1 lineal inch per chick (2.5 cm)	Two 1-gallon waterers per 100 chicks (3.8 L)	Keep air fresh. Ventilate moderately.	Use chick guard. Place waterers near edge of brooder. Dip beaks in water when placed under hover. Sprinkle feed on pieces of cardboard first 2 or 3 days. Fill feeders full.
2 to 6 weeks	Same	2 lineal inches (5 cm) per chick	Two 3-gallon (11.3L) waterers per 100 chicks, or 30 lineal inches (76 cm) of trough per 100 chicks	Increase ventilation to keep room cool and chicks comfortable.	Keep area around waterers dry. Stir litter.
6 to 8 weeks	Same	3 lineal inches (7.6 cm) per chick	30 lineal inches (76 cm) of trough per 100 chicks	Same	Put pullets on grower ration with protein level of 16%. Fryers should continue to be fed high energy broiler ration.

See the reference list for ducks and geese.

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Extension Service, Oregon State University, Corvallis, Henry A. Wadsworth, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U. S. Department of Agriculture, and Oregon counties.

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