

8-1941

EC1400 Nebraska Poultry Manual

J. R. Redditt

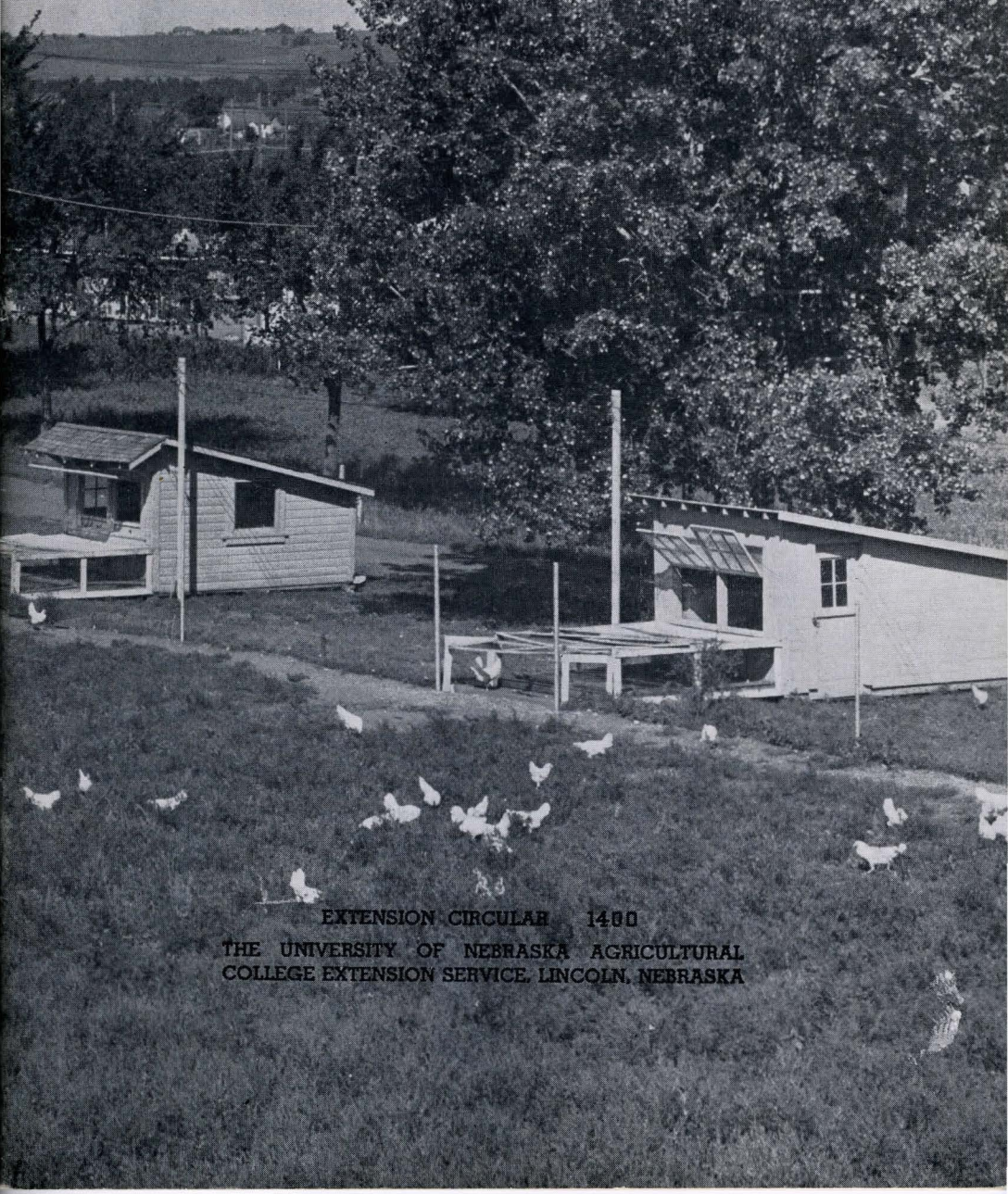
Follow this and additional works at: <http://digitalcommons.unl.edu/extensionhist>

Redditt, J. R., "EC1400 Nebraska Poultry Manual" (1941). *Historical Materials from University of Nebraska-Lincoln Extension*. 2501.
<http://digitalcommons.unl.edu/extensionhist/2501>

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

65
E7
#1400 C.I.

NEBRASKA *Poultry* MANUAL



EXTENSION CIRCULAR 1480

THE UNIVERSITY OF NEBRASKA AGRICULTURAL
COLLEGE EXTENSION SERVICE, LINCOLN, NEBRASKA

CONTENTS

Our Poultry Business.....	3
Incubation	4
Chicks	6
Brooding	9
Feeding Chicks.....	13
Summer Management of Pullets.....	16
Selecting Pullet Layers.....	18
Feeding for Eggs.....	22
Poultry Housing and Equipment.....	24
Select Good Layers.....	28
Laying and Breeding Flock Management.....	30
Broiler Production	36
Turkey Production	39
Capon Production	50
Marketing Live and Dressed Poultry.....	51
Quality Eggs	54
Marketing Eggs	57
Feeds and Formulas.....	60
Poultry Records	64

EXTENSION CIRCULAR 1400

AUGUST, 1941

Because poultry and egg production so far exceeds local demands, Nebraska producers have, in addition to the various problems of production, the other equally important problem of marketing. This involves not only a high standard quality of production but also suggests a system of grading that will denote and classify quality. Disposal of our surplus through methods that will return to the producers a maximum portion of the consumer's dollar could well be our goal. This general poultry manual attempts to outline suggestions pertaining to both production and marketing that will help attain this goal.

The author wishes to acknowledge the assistance of Prof. F. E. Mussehl, Chairman of the Department of Poultry Husbandry, and J. H. Claybaugh, Extension Poultryman, University of Nebraska.

Extension Service of the University of Nebraska College of Agriculture
U. S. Department of Agriculture Cooperating
W. H. Brokaw, Director, Lincoln, Nebraska

Distributed in furtherance of Acts of May 8 and June 30, 1914.

[5-41-5M; Rev. 8-41-10M]

Nebraska Poultry Manual

J. R. REDDITT

NEBRASKA'S present poultry income is estimated to be more than 30 million dollars. This represents an average of more than \$250.00 per farm family. Nebraska farms now have about 15 million mature chickens and in 1940 raised about 1,290,000 turkeys. During the hatching season, approximately 50 million chicks are hatched in the state.

Nebraska is a great surplus-producing area. In spite of an enormous home consumption of eggs, fried chicken, chicken stew, and roast turkey, several times the quantity used at home is shipped out of the state. If we ship more of the products than we use at home, it is necessary, in order to compete for a fair share of the consumer's dollar, to be correctly informed regarding consumer preference as well as how, from a producer's standpoint, to satisfy these consumer demands.

For example, if the demand is for clean, fresh, pleasant-flavored, reasonably light-yolk eggs of uniform size, shape, and color, it becomes our duty to know how to produce them if we are to compete on a price basis with producers who do.

This brings to mind a direct and specific challenge to Nebraska producers. Two to five cents more per dozen eggs could easily be added to prices that producers now receive if the eggs were of the quality described. And this amount is significant even though it may not appear so. For each one cent per dozen increase in the price of eggs shipped out of the state, about one million dollars in added egg income would be returned to Nebraska producers. Two-thirds of our poultry income is from eggs.

To a much greater extent than ever before, poultry and eggs have been providing the money for an ever-increasing number of incidentals for which ready cash is required. As a matter of fact, poultry and egg money has helped meet more and more of the major expenses of the farm and home. In this way, poultry is becoming more of a major farm enterprise and as such is receiving more consideration.

On Nebraska farms where the poultry enterprises have had careful consideration, good profits have been realized. When conditions were such that many other farm enterprises failed, poultry often was the chief source of income. Nebraska cost account records show that farm poultry raising responds to management and is capable of yielding profitable returns on labor and investment. Present agricultural conditions in Nebraska warrant the study and development of whatever enterprise is capable of yielding profitable returns.

Nebraska offers some advantages to poultry raisers worthy of consideration—for example our dry climate, well drained sandy soil, abundant sunshine, low-cost land, ample home-grown feed supply, and all-year markets for all classes of poultry products. Our long distance from market is offset by lower values on land, abundant feed, and low taxes. The cheapest and best way to market Nebraska field crops is through livestock. Providing jobs for young people on the farms is also one of the great advantages of poultry production in Nebraska.

It is well to remember also that poultry and eggs are inexpensive and highly nutritive sources of food. The annual per capita consumption of 26.2 dozen eggs, 22.1 pounds of chicken, and 3.2 pounds of turkey leaves no doubt about their food value. For this reason alone, every farm family would find it profitable to keep enough poultry to supply the family needs.

One should always choose a popular breed and variety, one that has done well and given satisfaction in the community. Choose purebred stock for the following reasons: Hatching eggs, chicks, and breeding stock from purebred flocks are in greater demand at higher prices. Purebred poultry produces a greater percentage of high-quality products at no greater cost, thus insuring greater returns. Eggs are more uniform in size, shape, and color. Egg production from purebred poultry is usually higher than from mixed and mongrel stock. A purebred flock is uniform and attractive; it is a source of pride to the owner and its fine appearance helps advertise it.

The American Poultry Association lists over 40 breeds and about 140 varieties of chickens. Type or shape determines the breed, and color and comb determine the variety. Breeds of chickens are grouped into classes, American, English, Mediterranean, etc., which usually denote origin. For details regarding standard breeds and varieties see Farmers' Bulletin No. 1506, U. S. Department of Agriculture.

INCUBATION

To poultry producers, the term "incubation" means the process of transforming eggs into strong, healthy chicks. This process, however, simple as it may seem, involves many conditions, some of which are determined by the breeding stock as well as by the actual process of incubation. These conditions require careful study in order to insure satisfactory results.

Even though the breeding stock has been carefully chosen, it is advisable to select hatching eggs carefully. This will insure better hatches as well as influence the kind of eggs that will be produced by the chicks hatched. Consider the following points in selecting eggs:

Period.—Chicken eggs require 21 days of incubation, turkey eggs 28 days, duck eggs 28 to 36 days, goose eggs 36 to 42 days, pheasants 22 to 24 days. With one day added in which chicks dry and fluff out, one can count on 22 days from setting time until they are transferred to the brooder.

Size.—This is important in fixing the market value of eggs. Use full-sized eggs weighing 24 to 26 ounces per dozen.

Shape.—Desirable market eggs are uniform and of characteristic shape, neither too round nor too long. The old notion that long eggs produce males and the shorter ones females has not been proved by experimental tests.

Condition of shell.—Select eggs of smooth, strong shells and reject those having ridges, cracks, transparent spots, or deposits of lime or other foreign substances. To avoid missing defects it is a good plan to candle eggs for hatching.

Uniformity.—To produce uniform quality we must see that the eggs that are set are uniform in size, shape, and color.

Hatching eggs should be gathered at frequent intervals to avoid undue chilling and heating. Keep them in a cool place, such as the cellar. Do not wash hatching eggs, and do not hold hatching eggs more than one week. Poor hatches are due to one or more of the following causes: poor fertility, poor breeding stock, improper care of eggs, and improper care of the incubator. Incomplete rations often lower fertility and hatchability. Constant fighting of the males will contribute to poor fertility, and too many hens per male bird will have the same result. Extremely cold weather and frozen combs on male birds usually result in lower fertility.

If the breeding stock is immature, aged, diseased, too closely inbred, or lacking in vigor, or if egg production is forced the hatches may be poor. Late-season hatches are usually less successful than early-season hatches. Chilling and heating, holding too long, and rough handling of eggs will cause difficulties in hatching, and the same may result from carelessness and lack of skill, improper temperature, moisture, and ventilation, and failure to turn eggs three times daily from the third to the eighteenth day.

Flock managers will have the best success if the breeding flock has not been unduly forced for egg production during the two or three months preceding the breeding season. The hatching power is generally best, too, when the egg production is on the increase rather than on the decline. Increasing production is a good indication of improving vigor, which is a prime requisite of the poultry breeding flock.

Fundamentally the job in hatching eggs is to provide just the right conditions for nourishing the little chick, which starts to grow in the fertile egg soon after it is put into the incubator. Hatching the egg then is really a nutritional problem. Eggs contain, besides the proteins, fats, minerals and vitamins, the very interesting chemical elements known as enzymes. These enzymes break down the food material that is stored in the egg, and make it available for the growing chick.

Natural Incubation

The hen may be the best hatcher but her use is limited. One should use the hen for small flocks and where little attention is given to market or commercial production. Her use is less expensive and less equipment is required.

Do not use the hen in large flocks or when producing market poultry and eggs. Here are the reasons: (1) Some breeds of poultry are not satisfactory for hatching. (2) The time of setting and hatching cannot be controlled. (3) Large, uniform, efficiently managed broods cannot be assured. (4) Care of large numbers of hens with chicks means more work.

For setting, select gentle, heavy-breed hens and provide clean, protected nests in quiet places where they will not be disturbed. Nests on the ground which are well bedded and protected are recommended. Place 15 hen eggs or 10 to 12 turkey eggs under the hen after she has been setting a day or so. Keep feed, water, and dust bath near so the hens may have access to them at will. Dust the hen for lice before she is given the eggs and once or twice before the end of the hatching period in order that newly hatched chicks will not be infested with lice. Use sodium fluoride.

Artificial Incubation

Incubators are necessary for profitable commercial poultry production. Home hatching offers an excellent opportunity for breed improvement and disease prevention. Chicks can be hatched in any season of the year. Early hatches insure early market poultry, which usually brings higher prices, and early-maturing pullets, which make early layers—the kind that usually make the most profitable producers.

Late chicks are usually more difficult to raise. Their hatchability, livability, health, and production are usually lower than for early chicks.

Incubators make possible the hatching of large numbers of chicks at one time. This shortens the season of brooding, which is usually a big job and an expensive one. Brooding is more likely to be neglected as it is prolonged. Incubators also lessen the danger of chicks' being bothered with lice and mites.

CHICKS

In order to choose and select good healthy chicks intelligently and efficiently, it is first necessary to know what good chicks are and be able to describe and identify them. It follows also that in order to do this we should know something about the parentage of the chicks.

Dependable Breeding Stock

Breeding stock from which healthy, promising chicks may be secured should have vigor and vitality. Vitality is indicated by good health and good production over a long period of time.

One of the primary causes of chick losses, inferior breeding stock, and unprofitable production is pullorum disease, which is transmitted from the parent stock to the chick through the egg. This can be identified and removed from the flock only through careful testing and retesting. If a testing program is accompanied by proper measures of sanitation and hygiene in the hatching of the eggs as well as in the care of the chicks, the disease can be controlled.

Any health record as well as record of performance (egg production) must be of proved and established reliability. Such records should be checked and approved by an impartial agency.

A poultry improvement plan covering these points and others pertaining to flock improvement and disease control is now being sponsored by the U. S. Department of Agriculture. It is known as the National Poultry Improvement Plan. In securing breeding stock, hatching eggs, or chicks, the purchaser should know to what extent National Poultry Improvement plans have directed the breeding and health program.

The National Poultry Improvement Plan

The plan is to have the organizations sponsoring poultry improvement programs in the different states adopt uniform rules and definitions and set up standard methods of grading poultry breeding stock, hatching eggs, and baby chicks that will protect buyers against extravagant advertising claims. It has federal supervision to enforce regulations. The Nebraska Poultry Improvement Association is the official state agency and the Poultry Department of the College of Agriculture cooperates. This grading pro-

gram is voluntary, and the flock owner or hatcheryman who desires to place his improvement work under supervision fills out the application and signs an agreement to observe the regulations. In return he may use in his advertising the standard terms which apply to his particular stage of the breeding program.

There are different stages that chick buyers need to understand before placing their orders.

1. U. S. Approved.—Covers breeding flocks, hatching eggs, hatcheries, and chicks. (a) Approved breeding flocks must be mated and banded by a licensed flock-selecting agent of proved and accepted qualifications. (b) Breeders must be banded with approved sealed bands. (c) Flocks must pass reinspection by a state supervisor. (d) Hatcheries, records, eggs, and chicks are subject to inspection.

2. U. S. Certified.—Covers flocks, eggs, chicks, and hatcheries. The same supervision is given this stage as is given the Approved stage. In this each male bird used in a U. S. Certified breeding flock must have known production breeding back of him and records must prove that the dams of the male birds laid at least 200 eggs in trapnests during their pullet year.

3. U. S. Record of Performance.—This record of performance embraces records of egg production made on the breeder's premises under official supervision and records of egg production made at officially conducted egg-laying contests. Such records must be passed upon by official state inspectors or supervisors and the individual birds must meet R. O. P. requirements. Thus, it is necessary to secure breeding males from the R. O. P. flock in order to establish certified flocks.

4. U. S. Pullorum Tested.—Flocks which have been tested according to acceptable methods and all reacting birds removed.

5. U. S. Pullorum Passed.—Flocks which have been tested under supervision and found to contain no reacting birds.

6. U. S. Pullorum Clean.—Flocks which have been tested under supervision for a number of years and where the records show that the flock contained no reactors in two consecutive tests not less than six months apart.

Dependable Chicks

Dependable chicks must come from disease-free parent stock and must be hatched under conditions which reduce chances of reinfection to a minimum. Breeders, both males and females, should have been tested to remove all pullorum carriers. The characteristics of good, healthy chicks are as follows:

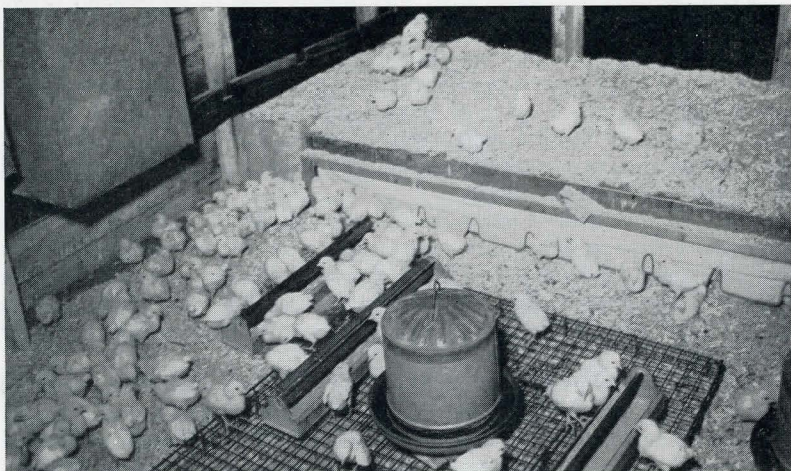
Hatched early (heavy breeds in March; light breeds in April).

Come from healthy, productive, standard-bred breeding stock, preferably in second or third year of production, which has survived rigid health and production tests.

Hatched, handled, and brooded under conditions that maintain health. (Eggs from untested flocks are not permitted in the same building with eggs from U. S. pullorum-tested flocks. Infectious respiratory disease may spread from battery brooders to incubators.)

Uniform in size, have long, downy fluff, weigh eight pounds per hundred chicks, and respond to efficient brooding, feeding, and management.

Result in uniform and well-feathered broilers, weighing 2½ to 3 pounds at 10 to 12 weeks and full-of-pep laying pullets at 6 to 7 months.



Efficient brooding includes the proper use of the proper equipment. Note screen-covered platform for waterers and feeders and the flat-top electric brooder in rear.

Started and Sexed Chicks

A fairly common practice, the merits of which are being looked upon with some doubt, is the purchase of started chicks. It appears that in some instances these started chicks have been blamed for disease outbreaks which occurred later. Indications are that such disturbances as respiratory diseases and range paralysis may have had their origin in started chicks.

When brooding facilities are limited, it is sometimes the custom to secure sexed chicks, usually pullets. When the production of broilers is a major enterprise, the preference will more likely be for cockerels.

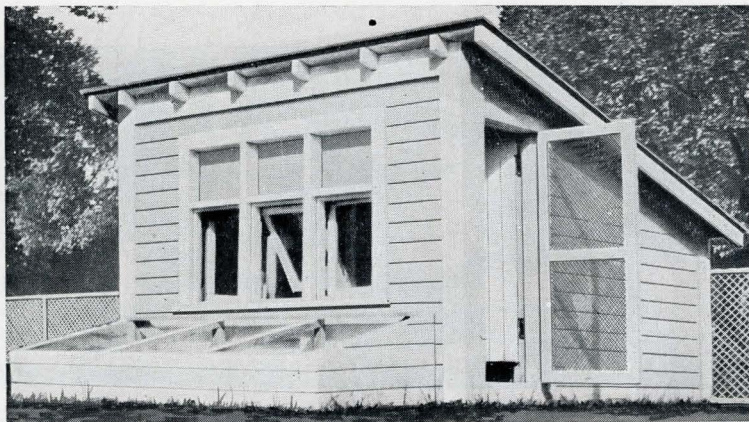
In answer to the question regarding any damage the process of sexing may have upon the chicks, it may be said that where the work is carefully done, little if any damage at all occurs. In the purchase of sexed chicks, it is well to keep in mind that the price is usually twice the price of straight run chicks plus the cost of sexing, which is about 2 cents per chick. This suggests that cockerels are paid for whether secured or not. Under these conditions it appears that where cockerels can be grown out as broilers, it might pay to follow this plan.

Cross-bred Chicks

It appears that when cross-bred chicks are regarded as superior to pure breeds as layers, the pure breeds with which they are compared are of rather

inferior breeding. In other words, well bred cross-bred chicks are quite likely to be superior to poorly bred purebred stock. In egg laying contests, however, cross breeds or hybrids have ranked far below purebred layers.

Generally speaking, discriminating egg markets pay two or three cents per dozen less for the creamy eggs of the popular Australorp-Leghorn cross



Portable, well built brooder houses with sun-parlors attached make ideal places to start chicks or poults. This 10 x 12 house with sun-parlor will accommodate 300 chicks or 200 poults.

than for either white or brown eggs of equal quality. A good many poultry markets discriminate against this cross because of the Leghorn characteristics and the blue or black shanks of the Australorp.

In the concentrated broiler production area along the Atlantic coast, the popular broiler is a Barred Rock-Red cross (Barred Rock males and Rhode Island or New Hampshire females). The parent stock used in this cross is bred and selected for vigor, large size, fast growth, and good feathering. The off-spring of this cross have the color markings of Barred Rocks. Some exceptionally attractive and well fleshed broilers have been produced in Nebraska from a cross of Dark Cornish males and White Leghorn hens.

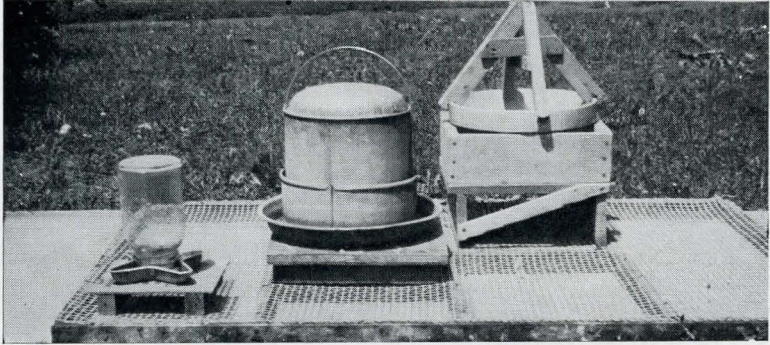
BROODING

Efficient brooding simply means providing, at reasonable cost, a suitable and comfortable environment for the development of chicks from hatching time until they can do without artificial heat. The size and purpose of the flock to be maintained, as well as the amount, kind, and condition of the brooding equipment, will of course influence brooding plans.

Because brooding lasts about two months each year, the use of convenient labor-saving equipment is recommended. Brooders must also be durable, economical to operate, easily adjusted and regulated, and above all they must minimize the danger of fire.

Chicks usually feather out sooner and more completely, show more

vigor, and develop more uniformly when brooded in a reasonably cool and humid environment. If the brooding arrangement will permit the chicks to get the warmth they require whenever they need it, they will make effective use of such a plan. Probably it is for this reason that electric brooders, set close to the floor and providing, as they do, a more natural "hen way" heat, are proving satisfactory.



Wire platforms beneath waterers protect chicks from damp litter. Chicks do not wade through elevated waterers.

Natural Brooding

Natural brooding is recommended when the flocks are small and poultry is raised for home use. Requirements for natural brooding are few and simple:

A gentle, motherly hen—one that has been a good setter.

A suitable brooder coop which will: (1) afford protection from weather and chick enemies, (2) be comfortable and large enough for the growing chicks, (3) be convenient to move, clean, and manage.

Suitable location, which provides: (1) convenience to the caretaker, (2) protection from wind, (3) sunlight and shade, (4) clean range, free from disease contamination, (5) proper drainage.

Artificial Brooding

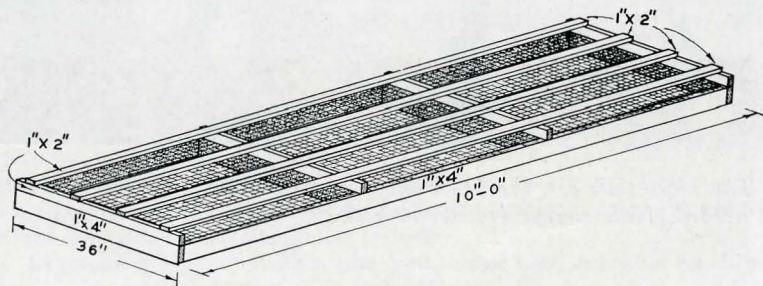
Artificial brooding is more efficient than natural brooding in the production of market poultry. Brooders permit the production of early broilers and early layers and thus contribute toward increased profit.

Requirements for successful brooding: A good brooder will afford a temperature of 95° to 100°F. under the hover, and plenty of room. When chicks are crowded they develop vices such as cannibalism, and proper development is retarded. Comfort is necessary to chicks at all times. Chicks should have an opportunity to get away from the heat and to exercise in cool air. Brooder temperature may be reduced about 5 degrees per week.

A good brooder should be easily regulated and fireproof. Kerosene brooders that allow fumes to accumulate in the house make ventilation a

greater problem. Brooders should be easily refueled, cleaned, and otherwise moved and managed.

Electric brooders deserve consideration because they are more nearly fool-proof, provide uniform heat, do not burn up oxygen, and are economical to operate.



Roosts can be nailed on the wire-covered frames. When roosts are in a slanting position around one edge of the building, chicks soon learn to use them. Preventing access to droppings is considered good management. Put in roosts the second week.

Battery brooders are fine for starting and brooding chicks for periods of about ten days, but after that their use is not recommended. This limited use makes them of questionable value to the average farmer.

A good brooder house should be large enough to accommodate the chicks comfortably and permit the caretaker to work conveniently. Brood a maximum of $2\frac{1}{2}$ chicks per square foot of floor space. It should afford protection from weather and vermin. Unless the house is light, much heat will leak out and brooding will be made more expensive. Ventilation without drafts is necessary. Permit direct sunlight to enter. Sunshine insures health and vigor. It is nature's most direct source of vitamin D. The house should be portable. Build the brooder house on skids, hitch a team to it, and drag it onto clean, well drained ground.

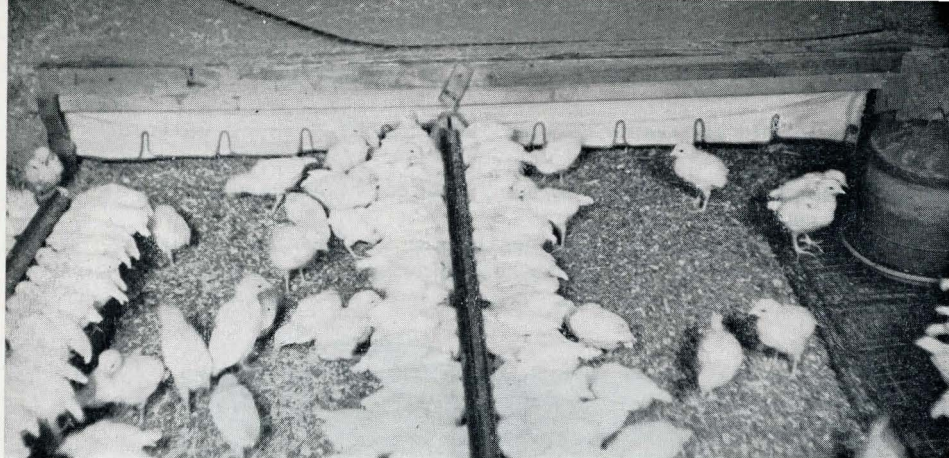
It should be located where it is convenient, protected from wind, and far enough from other buildings not to endanger them in case of fire.

In the preparation of the brooder and brooder house, thoroughly clean and spray with a good disinfectant. Lye in boiling water is a good cleaner. Use one pint of concentrated lye to 20 gallons of boiling water.

Overhaul the brooder and start it several days before the chicks are put into it to see that everything is in proper working order. This warms and dries the house.

Place sand in a ring around the stove to help hold uniform temperature and to reduce fire risks. Place guards in sloping positions around rear corners and between studdings. Cardboard from boxes may be used. Cover the floor with one inch of clean, fine litter such as wood shavings, cut hay, straw, sand, or peat.

Let chicks become thoroughly dry and strong enough to move about readily before removal from the incubator to the brooder. Do not permit



The more they eat, the faster they grow. In this scene more feeders are needed. Note electric brooder in back.

chicks to become chilled or overheated while being transferred. Confine the chicks near the source of heat for the first few days. A cardboard draft shield encircling the stove and about 12 inches from the outer edge of the hover will serve to fence them in until they learn where to find the warmth they require.

Successful brooding will require regular attention, including comfort of the chicks and sanitation. Observe the behavior of the chicks and regulate the heat accordingly. If it is too warm, chicks will be sleepy and inactive. If it is too cold, they will be in crowded huddles and probably chirping in distress. When comfortable, they are feeding, drinking, generally active and chirping with contentment.

Keep feed and water in containers that chicks cannot get into and see that the edge of the feeding and watering devices are higher than the vents of the chicks. After the first day or two, place feeders and waterers on hardware-cloth platforms. As the chicks get older, raise these platforms and use larger feeders and waterers. Clean the house as often as necessary.

As soon as the chicks are one or two weeks of age, put in low roosts. These may be made of lath or one-inch strips and arranged in a slightly slanting position. As chicks get older, roosts may be moved farther from the heat and raised higher. The early use of roosts will prevent crowding and thus insure more uniform development.

The use of a sun parlor permits chicks to get away from the heat, exercise in cool air, and have the benefit of direct sunshine. At least one feeder and waterer should be kept in the sun parlor.

As soon as cockerels and pullets can be distinguished, separate them. The cockerels may be thus continued on a fast-growing mash ration for market broilers, while the pullets may have more grain in their ration.

Let the chicks out on the ground and into the direct sunshine the first week, if the weather permits. The sun parlor in front of the brooder house is very helpful. Bank dirt or clean straw around the house to prevent chicks from going underneath. This will also help to keep the house warm. Do not crowd the chicks. Promptly remove all sick and dead chicks. Clean

often and spray after each cleaning. As the chicks grow, give them more room and keep different sizes and ages separated. If hatched by hens examine the chicks for lice. If lice are found, dust the chicks with sodium fluoride, using one part to four parts of fine sifted ashes.

FEEDING CHICKS

The proper feeding of the right kind of feeds to healthy chicks in a clean, comfortable environment should insure health and growth.

Feed a good, complete ration. The right feeds build up and replace worn-out body tissue. They furnish the body with heat and energy essential to the proper development and functioning of all organs. Feeds provide the vigor and vitality which enable the birds to resist diseases. In selecting a feed consider the following five factors:

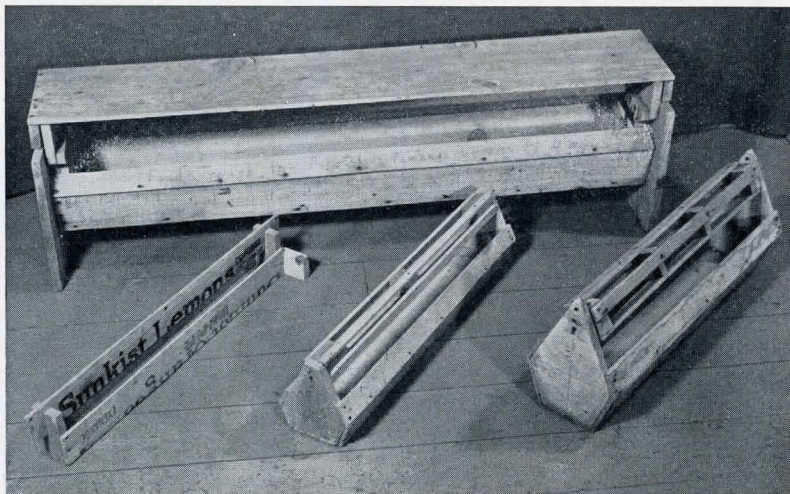
Digestibility.—How much of the feed can be used and how much of it is wasted by serving no beneficial purpose?

Composition.—Are the proteins, carbohydrates, fats, fibers, minerals, and vitamins of such nature and in such form and combination as to be used most effectively by the chickens?

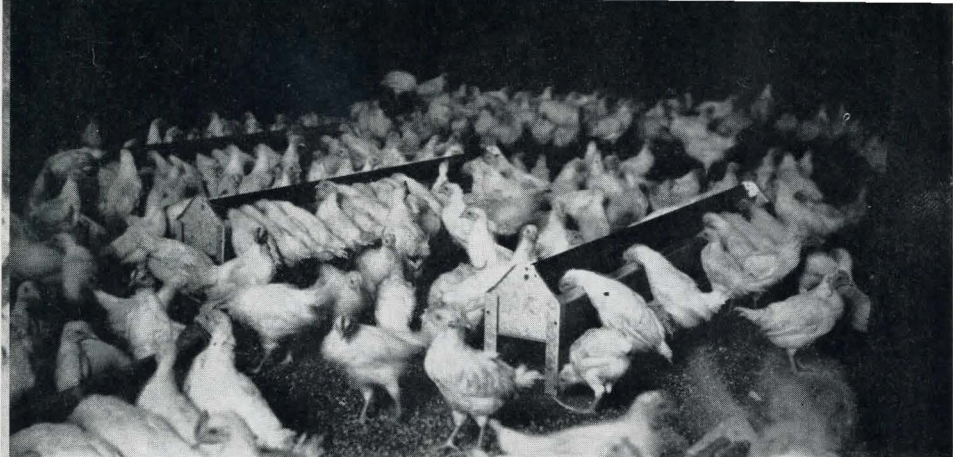
Palatability.—Is the feed readily and ravenously eaten by the chicks?

Wholesomeness.—Is the feed free from mold, dirt, filth or other foreign and nonessential substances?

Cost.—Are you getting your money's worth? Do you use the maximum amount of home-grown feeds? Have you studied formulas and kept informed on the prices of ingredients?



An assortment of inexpensive home-made feeders which are waste proof and sanitary. The three small feeders in front will do through the brooding stage while the larger one is fine for pullets two to four months old.



Growing chicks require lots of feeder space. As the chicks grow, larger feeders are required.

When to Feed

For the first 24 hours no feed at all is required. It takes about one day for the chicks to fluff out and learn to move around. Feed the chicks when they are from 24 to 48 hours of age or as soon as they have been put into the brooder house. Chicks that have been purchased from a hatchery and have been on the way as much as 24 hours should be placed in the brooder house and fed upon arrival.

What to Feed

The first feed that chicks have may be a good dry mash. They may have free access to it at all times.

If sour milk is available, it may be fed to young chicks from the very start. When it is fed, however, a mash mixture containing less protein concentrate may be used. Note in the formula (see page 60) that an adjustment for milk is included. Feed milk in crocks.

At two to three weeks of age chicks may have a grain mixture of two parts of fine cracked corn and one part of cracked wheat. As chicks develop, coarser grains may be used. When pullets go on range they may be fed whole oats.

Tender green feeds add bulk and vitamins to the ration and have a laxative effect which aids digestion and assimilation. Green feeds are essential to the continued health and development of chicks, and may be supplied in the form of alfalfa, dandelions, or lawn clippings cut into short lengths. Germinated oats fed after four or five days of sprouting are relished by chicks one to two weeks of age.

How to Feed

Feed dry mash in open hoppers and keep it before the chicks at all times. Provide one inch of feeder space per chick. If mash is fed and no grain added, this is known as the all-mash system. It is used for broiler production but not recommended for pullets intended for layers and breeders. This system requires ample room at the feeders so that the chicks will feed

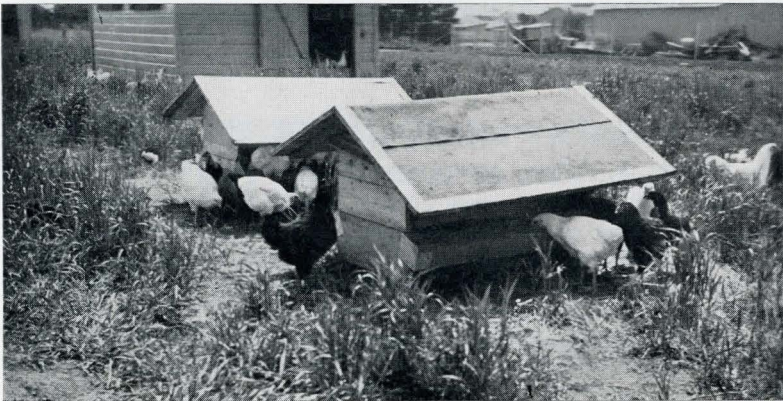
and develop uniformly. Feed consumption and rate of growth can be increased by using lights. Use wasteproof feed troughs and screened platforms to prevent waste and insure sanitation.

Scratch grain may be fed in the mash hoppers on top of the dry mash. This lessens the danger that chicks will pick up disease germs when grain is scattered in the litter. It also permits more intelligent or better managed feeding because it is possible to note more accurately the amount of feed consumed.

Feeding wet mash is a practice often followed to encourage heavier feed consumption, in broilers particularly. Amounts that will be cleaned up in 10 or 15 minutes are fed as an appetizer about noon daily. It is often customary to feed wet mash entirely for a week or ten days before broilers are marketed. Where this is done the birds are fed what they will clean up in about 10 minutes three to six times daily. The same mash mixture that has been fed as a dry mash may be wet with either milk or water. When wet mash is fed to broilers for fattening purposes, it is usually made fairly sloppy or about like pancake batter.

Unless chicks are out on clean, tender grass range some other form of green feed is recommended. Like the scratch grain, chopped green feed may be put in the dry-mash hoppers on top of the dry mash. Put in whatever they will clean up in 5 to 10 minutes. This may be done once or twice daily.

Fish oil, such as secured from sardines and cod fish, is rich in vitamins A and D. Vitamin A prevents nutritional roup and improves the rate of growth. Vitamin D aids in mineral fixation (absorption of calcium and phosphorus), thus reducing the danger of rickets, crooked breast bones, and soft-shelled eggs. Fish oil is a substitute for sunshine during the winter or whenever chicks are kept confined. It is necessary for early broilers but to lessen the danger of a fish flavor it is usually discontinued about a week

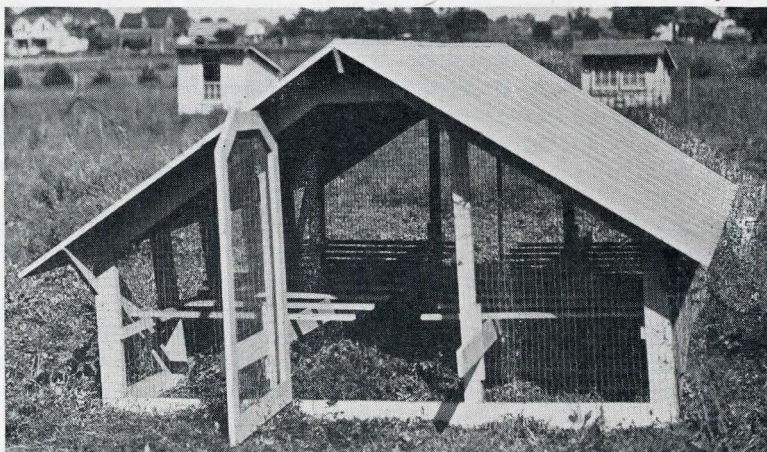


Outdoor feeders for growing chicks on range. One contains mash and the other grain.

before market time. Fish oil is usually used at the rate of about 1 per cent in the mash mixture (1 pint to 100 pounds of feed). To mix fish oils with the mash it may be first mixed with the cornmeal and the other ingredients added. Unless this is done a lumpy, poorly mixed mash is likely to result.

Preventing Cannibalism

To keep chicks from picking and eating each other, the following practices are recommended: (1) Feed a complete ration and see that mash is fairly coarse. Increasing salt to $1\frac{1}{2}$ per cent is recommended. (2) Do not crowd the chicks. Let them get away from each other. Have enough feeders and waterers so that half of them can eat and drink at the same time. (3) Brood chicks at the coolest temperature they will stand. (4) Put in roosts at two weeks and get chicks to roost as early as possible.



Summer shelter sheds are necessary equipment when pullets are moved to clean range.

SUMMER MANAGEMENT OF PULLETS

Healthy, thrifty pullets that lay well during the fall and winter when egg prices are high are the result of good, well-planned management. Experience has taught us that we must make good management a continuous process if we want to make the venture most profitable. In other words, negligence and carelessness cannot be a part of a profitable poultry program.

During the summer when the weather is hot and shade and green feed are scarce and many other farm duties require a great deal of time, there is too often a tendency to let the chickens get along the best they can. Feeds and feeding schedules are neglected, watering is no longer considered important, cleaning is delayed, and good management generally is forgotten.

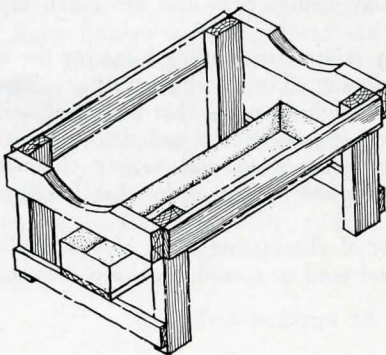
Whenever this occurs, watch out for stunted growth, weak, sickly chickens, worm infestation, roup in the early fall, and general unthriftiness and unprofitableness.

The object of good summer management of pullets is to insure good health. Good health can usually be assured if pullets are put out on clean range at about 8 to 10 weeks of age and left there until they are about 20 to 24 weeks of age.

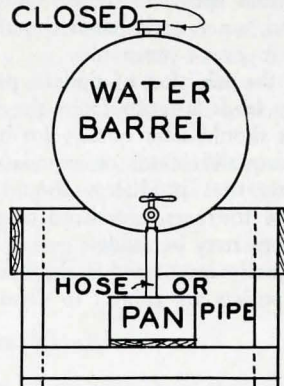
Effective Practices

Provide a complete ration. Hopper-feed grain and mash (No. 8-S) in separate sanitary waste-proof, wind-proof outdoor feeders. Provide one three-foot bungalow feeder each for grain and mash for each 100 chickens. Put feeders on screen or slat-covered platforms.

Provide clean range. Use cultivated fields (corn fields are fine), wind breaks and orchards, or if chickens have used the ground plow it and sow it to green feed.



MUST BE AIR
TIGHT WHEN
CLOSED.



LEFT: Automatic waterer showing stand and pans before barrel is put in place. RIGHT: End view of automatic waterer with barrel in place. All connections must be air tight.

Provide green feed. It will pay to sprout green feed or cut it from other crops rather than let the chickens go without it.

Provide clean, fresh water. Barrels equipped with troughs and with automatic control for water flow are proving quite satisfactory. Do not medicate water. Keep it and containers clean. Use filth-proof, waste-proof waterers. Put waterers on screen- or slat-covered platforms.

See that chicks have access to shade. If natural shade is not available, make a shade shelter by putting hay, straw, brush, burlap, or boards on a skeleton frame made of strips or poles.

Provide a comfortable shelter. Inexpensive roosting sheds that two husky boys can lift and carry can be made to accommodate 100 pullets.

Cull, kill, and burn promptly any weak and unthrifty pullets. Sick birds spread disease. Do not depend upon medication for health.

Feed skim milk or buttermilk if available. If skim milk is plentiful only half the protein concentrate need be included in the mash mixture. Thoroughly clean and scald milk containers every other day.

General suggestions to follow: Cod-liver oil is not necessary in the summer if the chicks have access to direct sunshine. Screen the chickens away from the droppings. Do not feed scratch grain or wet mash on the ground. Put it in a trough. Never allow chickens to drink from puddles. Drain or fill them.

SELECTING PULLET LAYERS

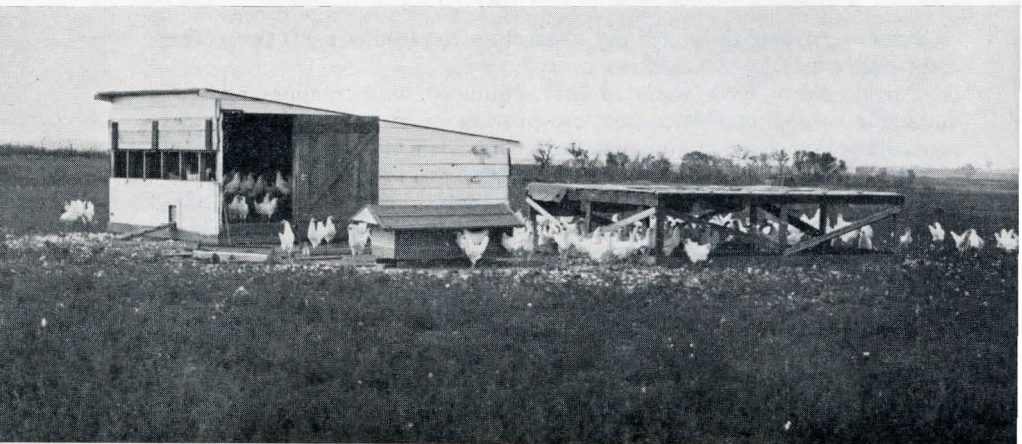
Upon the kind of pullets selected and used in the egg-production and flock-management project depends the success of the venture.

Pullets should be selected as early in the fall as possible, preferably the latter part of September. This permits the selection of the larger, faster-growing, more promising pullets. It also gives ample time to watch further growth and, if necessary, make final selections before much time and feed have been spent on them. Only pullets hatched before May 1 should be selected, since early-hatched pullets lay winter eggs and are much more likely to prove profitable.

In the selection of pullets, poultry raisers are cautioned against the use of any birds inferior from the standpoint of breed characteristics. These pullets should later qualify for breeders, which means that those possessing any disqualifications or serious defects should not be included. This also suggests that producers should know the breed and variety characteristics of the particular kind of chickens they use in order that intelligent selections may be made.

Equally important is the necessity of eliminating birds of low vitality. Such pullets are subject to disease and tend to spread and keep disease in

First pullet selection occurs when cockerels and pullets are separated at the end of the brooding period. No weak and slow-growing pullets are permitted to go on range. Vigor and rate of growth are the main points to consider in selecting pullet layers.



the flock. They seldom produce enough eggs to be profitable. They make poor breeding stock in that their offspring will likely be of low vitality and poor productive ability.

Indications of Poor Breed Quality

Deformities of shape and plumage.—This includes body shape, deformed beaks, crooked backs, slit wings, split wings, twisted feathers in wing or tail, entire absence of main tail feathers, and decidedly wry tails and squirrel tails.

Combs, earlobes, shanks, feet.—Avoid the choice of birds having split combs, side sprigs on all single-comb varieties, and absence of spike in rose comb varieties. Lopped combs, except in Mediterraneans and a few odd varieties and breeds, and rose combs falling to one side enough to obstruct sight are disqualifications.

Enamel white in the earlobes of males or females of all American and Asiatic varieties disqualifies such birds for breeding purposes.

In all breeds required to have unfeathered shanks any feather or feathers, stubs, or featherlike growths on shanks, hocks, feet or toes are cause for elimination. Legs or toes foreign to the color of the breed should be avoided. Do not select Plymouth Rocks or Wyandottes that have green shanks. For the same reason eliminate Orpingtons that have yellow legs.

Color foreign to the breed.—Avoid the selection of birds having foreign-colored plumage or, in the case of Barred Rocks, solid black feathers in the wing or tail. Eliminate any birds having brown or buff quills in the main wing feathers of white varieties.

Uniformity of color.—Examine the undercolor of colored varieties to be sure that no unworthy specimens are chosen. Rhode Island Reds should be red clear down to the skin in both quill and web of feather. Buff varieties should be buff and not orange colored. In Barred Rocks the barring should be well defined, straight across the feather and clear down to the skin in all sections of the body.

Indications of Low Vitality

Long, narrow heads with sunken eyes showing lack of pep indicate low vitality. Such birds are often called "snaky heads" and "crow beaked."

A shallow, narrow body set high off the ground also shows this condition. Such birds have shallow or poor feeding capacity which tends to lessen the chance of their ever becoming profitable producers.

Pale color in head, beak, and shanks is often associated with nutritional ailments and may indicate low vitality as a result of a lack of feeds essential to development and health.

Small, slow-growing birds should be eliminated. Any stunted or runt-sized pullets should be avoided. Such birds are usually weak and, because they are, tend to keep disease in the flock. Eggs they lay are often small and undesirable.

To maintain uniformity in appearance as well as production, poultrymen are advised to avoid the selection of coarse, inactive, oversized birds. In other words, choose birds of refinement, uniformity, and alertness.

Indications of High Vitality

Short, deep heads with prominent eyes and short, stout beaks are good indications of high vitality. Along with these characteristics it is well to select pullets showing fair comb and wattle development because this indicates maturity.

A long deep body and wide back indicate feeding capacity essential to production. Good layers eat lots of feed.

Straight legs wide apart and set firmly under the body permit the birds to have good balance, which improves their appearance. This also indicates strength and vitality.



Pullets thrive on clean grass range.

In yellow-legged varieties a good, deep, rich yellow color indicates good health and stored-up energy.

Good, thrifty pullets are wide awake and full of pep. They have prominent, wide open eyes and a quick, live movement.

Handling the Pullets

Avoid rough handling. This tends to frighten pullets and make them nervous. Gentle pullets indicate that they have had the good, kind management essential to their well-being and profitableness.

Avoid crowding. Putting too many pullets into coops or small quarters may result in deaths from smothering. Do not frighten pullets. Sudden fright causes nervous shock which often disturbs production.

Putting the Pullets into the House

Pullets should be housed a week or so before they start to lay. This means that the house should be ready for use. To be ready, the house and all equipment should be thoroughly cleaned and disinfected. The floor should be covered with 8 to 10 inches of clean straw, the nests should be well bedded, the feed hoppers properly arranged and filled, and other equipment arranged as it is to remain during the year.

Before the pullets are put into the laying house, it would be a good plan to treat them for lice through the use of either sodium fluoride or nicotine sulfate.

Fall Molting

Fall molting of early maturing pullets has been the cause of much disappointment, since it frequently occurs about the time full egg size and highest prices have been reached. Because so many well managed and well fed flocks go through heavy fall and winter production without molting, it appears that this can be prevented. In studying management practices in flocks free of fall molting, it may be noted that considerable attention is given to breeding, the time of hatch, the rate of maturity, fleshing, and comfortable housing.

At the Nebraska Experiment Substation at North Platte checked observations on time of hatch with respect to maturity and efficient production indicated that heavy breeds should be hatched the first half of March and light breeds the first half of April. It has also been noted that best results may usually be expected when pullets are allowed plenty of time for development. Apparently it is a mistake to hasten pullets into early maturity and production. From these observations it is suggested that heavy breeds be brought into production at around 7 months of age and Leghorns at about 6 months of age.

Good poultry management suggests that when pullets start laying, they should be comfortably housed and fed for egg production. When pullets get into fair production, slight disturbances may throw them out of production and into a molt. Fright, associated with moving, as well as shock, associated with extreme weather changes, may be causes of the pullets going out of production and into a fall molt. It is very important to see that body weight is maintained during this period of fall production. When weather is mild and other conditions are favorable, young pullets may lay so heavily that they lose body weight. This is a danger signal and should not be ignored.

By having plenty of feeders, laying hens are encouraged to eat more feed and lay more eggs.



Records

When the pullets are put into the house, have the necessary record forms ready for use. Keep accurate tab of the number of pullets, eggs laid, feed consumed, and all costs.

FEEDING FOR EGGS

Efficient feeding of poultry, under our modern system of production and management, is necessary if the enterprise is to prove successful. By efficient feeding is meant supplying feeds which will maintain health, growth, and production and at the same time be available at prices justifying their use. Efficient feeding also applies to methods as well as feeds. As the number of birds in the flock increases, the disease hazards also increase, and this in turn necessitates the use of sanitary methods and equipment. Poultry producers are urged to look upon the feeding of poultry as the most important single factor in the health, production, and profitability of the flock.

Feed a good and complete ration. (See pages 60-64 on the feeds and formulas.) Profitable egg production is possible only through proper feeding. In selecting a feed for egg production consider the same five factors mentioned earlier (page 16). Obtain feed bulletins from your county extension agent. Study prices of feeds and the possibility of saving money through home mixing of feeds. A number of farmers might make further savings by working together.



When mash feeders are put on the roosting rack, the hens eat more feed and lay more eggs. The wire screen underneath and in front of the roosts helps maintain health and clean eggs. Rear doors over the roosts provide cool, cross ventilation in hot summer weather.

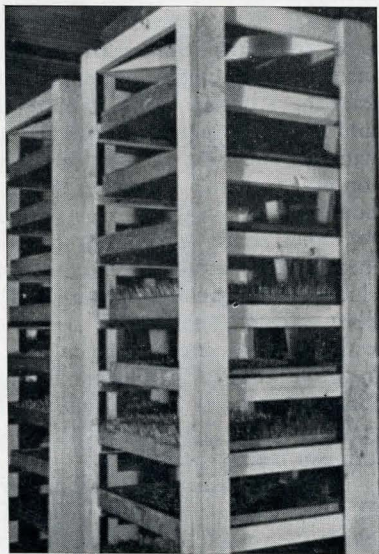
Feeding Practices

Dry mash.—The most common method of feeding dry mash is to keep it before the hens in open hoppers at all times. To stimulate greater mash consumption, quantities which the hens will clean up in 10 minutes may be wet and placed on top of the other mash in the open hoppers. This is an excellent winter-time practice when fed about the middle of the day. To prevent waste, use waste-proof hoppers and do not fill them more than two-thirds full. Increasing the amount of feed the hens consume daily stimulates egg production.

Wet mash.—Because such improved results in the way of increased egg production, good health, and good body weight have been noted in flocks fed wet mash, the practice is becoming fairly well established in many well managed flocks. In some cases the same mash mixture the hens are fed as a dry mash is simply wet and fed in portions they will clean up in about 15 to 20 minutes. Another and seemingly preferable practice is to feed a specially prepared fleshing mash.

At the University of Nebraska Experiment Station a fleshing mash, used several years because of the good results obtained, consists of three parts ground corn, three parts ground oats, three parts shorts, and one part soybean oil meal. This mixture, wet with skim milk or buttermilk to a fairly wet though not sloppy mixture, is fed in quantities the hens will clean up in about 20 minutes. A common practice in feeding wet mash is to feed it about the middle of the day and put it on the dry mash in open hoppers.

Scratch grain.—Feed daily about 12 to 14 pounds of scratch feed per hundred heavy hens and about 10 to 12 pounds per hundred Leghorn hens. Feed scratch grain in hoppers on top of the dry mash, never on the floor in filth and dirt. Successful poultrymen often feed about one-third of the scratch in the morning and the remainder about one hour before the birds go to roost. Allowing free access to scratch grain is apt to produce fat hens and few eggs. During the winter months more scratch grain is us-



Sprouted oats provide a highly relished and nutritious form of green feed that can be grown any season of the year. Racks and trays like these in a basement make oat sprouting an easy chore. Sprouted oats may be fed to both young and mature chickens and turkeys from germinated stage to three-inch sprouts. Chop long sprouts for young chicks or poults.

usually consumed than mash. During the summer about equal amounts of scratch grain and mash are fed.

Succulent feed.—Green feeds improve the appetite, aid digestion, and furnish vitamins, minerals, and fiber. There is some danger of green feeds, such as onion tops, affecting the quality and flavor of eggs. Feeding daily three pounds of sprouted oats (dry weight) per hundred hens is a recommended practice. Oats are easily and economically germinated by soaking in water over night and then hanging up to germinate in a burlap sack. If more than 12 or 15 pounds of oats are put into the sack, there is danger of mold. Germinated oats are usually fed with the morning scratch feed and like the scratch grain may be fed on top of the mash. Do not feed oats on the ground or on the floor of the house because in their damp state dirt and filth will cling to them.

Other feeds.—Alfalfa, as succulent green feed, as hay in racks, or as meal in the mash, is an excellent and economical feed which should be included in the poultry ration. It is fed for protein, vitamin, mineral, and fiber content. Alfalfa meal can be ground with a hammer mill equipped with a $\frac{1}{8}$ -inch screen. Alfalfa may be used at the rate of 5 to 15 per cent in the dry mash. It is now recommended that the poultry ration contain about 10 per cent fiber, whereas a few years ago less than 5 per cent was recommended. The increased fiber content seems to lessen cannibalism and improve feather growth.

Minerals.—Keep oyster shells or crushed limestone before the hens at all times and include 1 per cent of fine salt in the mash mixture. These add to the palatability and calcium content of the ration. No other minerals need be added to carefully selected Nebraska-grown rations. Use clean gravel for grit.

Water.—Keep clean, fresh water before the hens at all times in clean, filth-proof containers.

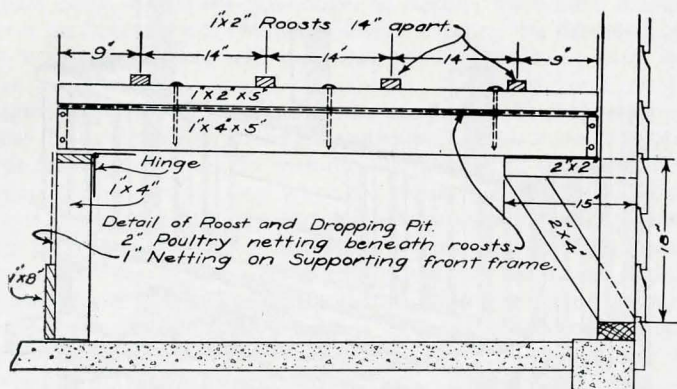
Fish oils.—The hatchability of eggs seems to be improved through the use of fish oils. Eggs from hens fed fish oils contain ten times more vitamin D than eggs from hens not fed this product. Fish oils also improve egg-shell structure. Egg yolks are the richest common source of vitamin D and, therefore, constitute one of our most essential foods.

POULTRY HOUSING AND EQUIPMENT

Success with the laying flock depends largely upon the environment and housing conditions. Hens must be kept comfortable to insure health and



A modern laying house 20' x 60'. It will accommodate 350 Leghorn hens.



Details of a sanitary roosting rack.

maximum egg production. Main factors to consider in housing the poultry flocks are (1) maximum of hen comfort, (2) convenience of caretaking, and (3) economy.

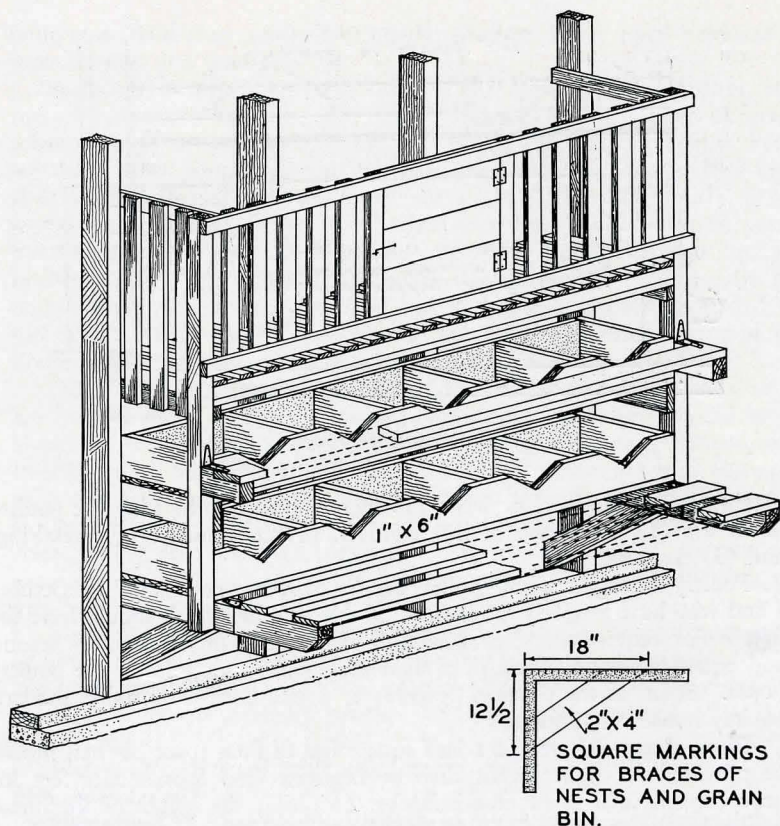
Poultry managers whose pullets are six to seven months old by October 1 and who have properly developed and selected their stock should have the first major requirements for profitable winter egg production. A second and equally essential phase of a successful poultry program is the poultry house. Some of the essential features of a safe and comfortable modern poultry house are as follows:

Floor space.—Three and a half square feet of floor space per hen should be provided for light breeds such as Leghorns and four square feet for heavy breeds such as Plymouth Rocks. (Multiply the length of the house in feet by the width and divide by $3\frac{1}{2}$ for light hens or 4 for heavy hens to determine the hen capacity of the building.) Overcrowding endangers health and increases labor.

Ventilation.—No rules or systems for ventilating poultry houses have proved effective or dependable. About the most satisfactory plan of ventilating the house is through a convenient window arrangement similar to that used in our own dwellings. Frost on the windows and walls does not necessarily indicate poor ventilation. Cool summer ventilation is secured in deep houses by cross drafts when windows and ventilators on both the north and south sides are opened.

Insulation.—Insulation with straw, shavings, or other materials is a means of making the house warmer in the winter and cooler in the summer. Straw lofts are used for the same reason. Consider carefully the added cost of insulation. If it can be provided economically, it is recommended.

Windows.—Windows provide light and ventilation. The size, number, and arrangement should be considered with these points in mind. It is good, practical economy to choose standard-sized sash. One square foot of glass or glass substitute for each 10 or 12 square feet of floor space provides a well lighted poultry house.



Sanitary, self-locking nests with handy broody coop attached. When the jump boards in front of the nests are folded up, they lock in place. This arrangement will keep hens from roosting in the nests and thus insure more clean eggs. Broody coop should have slanting cover to prevent roosting.

Floors.—Dirt floors are cheapest but hardest to clean and keep free from disease germs. Board floors are usually quite satisfactory when elevated above the ground and constructed so as not to harbor rats and mice. Cement floors are more permanent and appear to be more popular with experienced poultrymen. Elevate the floor above the surrounding ground. Put cement on porous substances such as hollow tile or crushed rock with waterproof roofing beneath the cement to prevent the rise of moisture from the ground. Asphalt emulsion and soil, properly mixed, make very satisfactory floors for poultry houses. Floors should be 5 inches higher in the rear of deep buildings to help keep the litter level and permit drainage when washed. Keep the floor covered with several inches of litter.

Dropping boards (optional).—They make house cleaning easier, keep

floor space clean, and lessen the danger of disease. Less litter is required because it isn't necessary to change as often. Painting the dropping boards with a wood preservative will keep out mites as well as insure lasting qualities.

Manure pits or roosting racks.—Roosts are placed about 15 to 18 inches above the floor with tightly stretched poultry netting underneath to prevent the birds from getting into the manure. Advantages of the roosting rack: (1) droppings are cleaned out when the litter is changed; (2) free air movement during the summer provides greater comfort; (3) feeders and waterers may be placed across the roosts during the day, thus insuring complete use of the whole interior; (4) by slanting the roosts slightly or raising the back 6 to 8 inches higher than the front, birds are encouraged to use the rear perches; (5) they are less expensive than dropping boards.

Roosts.—Place roosts 14 inches apart and allow 8 inches per bird. Paint with wood preservative to keep away mites. Two by two material, if rigidly supported, makes excellent roosts.

Nests.—Allow one nest for each 5 hens. Movable nests are easier to clean. If nests can be closed at night, they can be kept cleaner.

Feed troughs.—Use only filth-proof, waste-proof feeders. Allow enough space for one-third of the hens to eat at once. (Twenty hens can eat from two sides of a 4-foot feeder.)

Grain bins.—Grain bins built in the corner of the house and above the floor provide a convenient and clean place to keep a supply of grain.

Water.—Use only waterers that protect the water from filth.

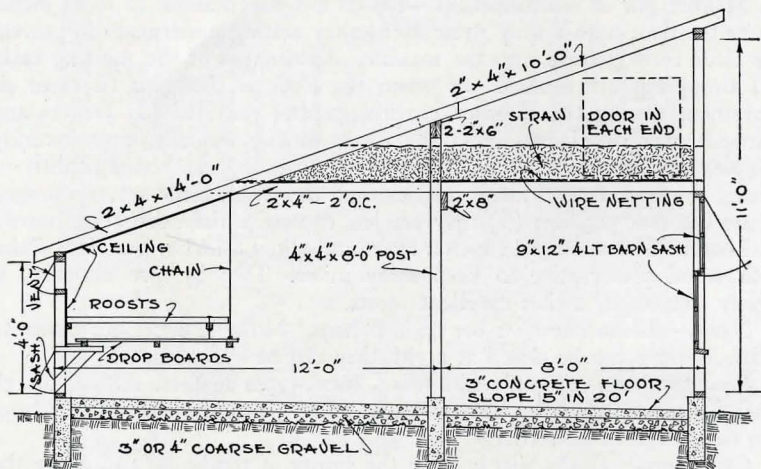
Broody coop.—This is handy for breaking up broody hens. (The sooner, the better.) Equip the broody coop with feed and water cans.

Remodeling.—The efficiency and comfort of many farm poultry houses have been materially improved through remodeling. Popular and efficient forms of remodeling have consisted of enlarging, improved lighting, ventilation, straw loft insulation, floor construction, and the addition of roosting racks and modern improved equipment in the way of nests, feeders, and waterers.



A remodeled poultry house.

Before remodeling the poultry house, make a survey to determine the needs of the flock to be kept and the condition of available housing equipment. In some instances barns and other buildings are remodeled and used for laying hens as well as for brooding chicks.



Cross-section of a remodeled poultry house. The width has been increased to 20 feet, ventilator and cellar sash placed in the rear wall, and additional windows installed in the front wall. A small straw loft has been provided to aid in keeping the house warm in winter and cool in summer. The rear wall and part of the roof have been covered with ceiling to stop north winds in winter.

SELECT GOOD LAYERS

The removal of unproductive and unhealthy members of the flock at frequent intervals throughout the entire year is a practice well established among those whose flocks really pay dividends. For efficiency, a knowledge of a few methods is necessary. The time required is not great; in fact, the removal of unproductive chickens, or "culling," can be made a part of a routine and need not require more than a few hours per month. The directions that follow apply in a general way to all breed types. Slight modifications can be made in accordance with variations in breed characteristics.

Culling Technique

Since the handling of laying hens usually slows up egg production, the best culling method is one that will disturb the hens the least. A means of assuring this is to use a "catching coop," which has an opening at one end that may be set against the small door of the hen-house. Hens are then gently driven in and removed one by one from the house. Using a wire fence inside the house is probably quicker. A few hens are driven into a small wire pen and a catching hook is used to remove them from it.

In handling chickens there is only one good way; that is holding the bird's head always toward the operator's body with its breast-bone resting in the palm of the hand, the forefinger between the bird's legs, and the legs held tightly with the rest of the hand. By this method any bird can easily be held without harm to bird or person.

Successful poultrymen do all-year culling and remove poor layers whenever they appear. Without disturbing the good layers, these are caught with a catching hook and removed. This system of culling when properly done insures maximum production averages, is a factor in keeping costs low, and is also helpful in lowering the death rate.



Keep good old hens over the second year, but cull continually to protect the health of the flock and remove low producers. Successful poultrymen cull 50 per cent of the flock from October to October.

One should first determine whether or not the hen is in laying condition. Laying condition is denoted in three ways: (1) comb and wattles enlarged, smooth, and usually red; (2) abdomen dilated and comparatively soft and pliable; (3) vent enlarged, moist, and pliable.

Culling for egg production can be done more accurately during the latter part of the hen's first production year. Before pullets begin to lay, it is difficult to apply production characteristics to them; consequently they are judged chiefly by development, rate of maturity, and indications of vigor. By the use of these tests, a large percentage of the outstanding culls can be taken out before much housing space or feed is wasted on them. Select the healthy pullets that have well-developed bodies, refined, strong-appearing heads, and bright, intelligent eyes.

A good layer will show part or all of the following characteristics. The first eight are the most important.



Direct sunshine and tender green grass are great health builders. The breeding stock should have the benefit of these important and invigorating factors.

Good Layers Usually

1. Molt late—starting after October 1.
2. Molt rapidly—dropping great numbers of feathers at one time.
3. Have clean-cut, strong, refined heads.
4. Have large, bright, prominent eyes.
5. Show refinement—in comb, wattles, legs, and skin.
6. Are active, alert, and healthy.
7. Have flattened (or triangular) lean shanks.
8. Lose the yellow color from their beak and shanks. (Applies only to yellow-shanked breeds.)
9. Are deep-chested and slab-sided.
10. Have worn, weather-beaten plumage from spring until they molt in the fall.
11. Have pointed flexible laybones (or pubic bones), which are on each side of the vent.
12. Have broad, flat backs.
13. Have soft, pliable abdomens.

Poor Layers Usually

1. Molt early—before October 1.
2. Molt slowly—dropping just a few feathers at a time.
3. Have coarse, meaty, or else thin, weak-looking heads.
4. Have small, sleepy, or sunken eyes.
5. Show lack of refinement—roughness and coarseness in comb, wattles, legs, and skin.
6. Are “peppless” or sleepy.
7. Have rounded, fat shanks.
8. Retain part or all of their yellow color in beak and shanks. (Shows only in yellow-skinned breeds.)
9. Are shallow-chested and round-bodied.
10. Have sleek, shiny plumage at all times unless sick.
11. Have thick, meaty, rigid laybones.
12. Have rounded, narrow backs.
13. Have hard abdomens.

LAYING AND BREEDING FLOCK MANAGEMENT

Poultry profits are determined as much by the management of the flock as the flock itself. Management covers feeding, housing, sanitation, breeding, and marketing. What is so often regarded as luck is good management, while much of the so-called bad luck is poor management.

Assuming that a hen is an egg factory, we can appreciate the necessity of providing the necessary raw materials and machinery for making eggs. In other words, we must realize that the kind of produce is determined by the equipment and materials used.

Health

Only healthy hens lay eggs. This means that keeping laying hens in good health is the most important part of poultry management. Observe these essential factors:

Watch sanitation. Since most harmful and incurable diseases are spread through filth (droppings), cleanliness must be maintained in order to insure health. Clean the house and put in new litter every two or three weeks in the winter. Use clean feeds and feeding equipment. Follow clean practices. Keep clean, fresh water in clean containers. Scrub and scald these every week. Always remove promptly any sick or dead birds. Sick birds that have recovered are of doubtful value because of the danger of being disease spreaders. Drain or fill stagnant puddles where chickens might drink.

In the proper feeding of complete rations lies the insurance of vitality and ability to withstand and resist disease.

Practices to avoid are the use of (1) general vaccines (vaccination is recommended for the control of chicken pox and infectious bronchitis but not for cholera, typhoid, coccidiosis, blackhead, fowl tuberculosis, or pullorum disease); (2) medicated feeds and drinking water (the use of potential health-promoting tonics to be put into the feed or water is not recommended); (3) patent medicines and remedies for pullorum disease, coccidiosis, typhoid, roup, blackhead in turkeys, or cholera; (4) periodic worming (healthy chickens are not disturbed by a few worms and the presence of them in sickly birds may not be the cause of the trouble). A good feeding and management program will control most of this trouble.

Ridding the Flock of Lice, Mites, and Worms

Poultry parasites such as lice, mites, and worms reduce poultry profits. They also reduce poultry health and vitality. Since their riddance, however, is quite simple, it would pay well to do without them.

Poultry may be treated for lice with sodium fluoride (dry or dip), blue ointment, or nicotine sulfate. Mites may be controlled through the use of any good wood preservative or creosote products diluted with kerosene, 10 parts to 1 part creosote. Thorough spraying of the house should be preceded by thorough cleaning.

Worms are controlled most effectively through good management rather than through worm treatments.

Sanitation in feeding and watering along with good management, clean range, and an adequate feeding program are the recommended practices in the control of worms.

For detailed instructions see Nebraska Agricultural Experiment Station Bulletin 332, "Poultry Diseases and Parasites."

Housing

Perhaps it would be more appropriate to call the hens' abiding place a home instead of a house. In doing this, we can more nearly appreciate the importance of maintaining a comfortable, clean, and vermin-proof environment.

Arrange the house and the interior equipment so that it is convenient for both the caretaker and the hens. Avoid the use of extra heavy equipment that is difficult to handle and keep clean. Without cluttering up the house, put in as many labor-saving devices as possible.

Have plenty of direct sunlight. Sunlight is the best germ destroyer known. The more of it we can get into the poultry house, the better. Hinge the windows and doors so that they can be opened in good weather to let direct sunshine into the building. Not many disease germs will thrive in a dry, sunny house.

Avoid drafts. During the winter admit all the air on one side of the house and have the other three sides tight. Feathers are a hen's overcoat. They act as an insulator, holding in the body heat. They are good protection against cold but not against drafts. Watch the behavior of hens and note that they seek shelter from strong winds or drafts. Nothing induces colds and roup or spreads these diseases so quickly as drafts.

It is well to maintain the service value of the house and the protection to the flock that it affords. Examine the house carefully to see if drafts and leaks can be stopped. Perhaps some remodeling is in order in the way of more nests, roosting racks, grain bin, catching coop, larger windows with hinges, or a screen door. A sun porch or small outside enclosure can be added which will permit the birds to have direct sunshine and yet be protected from the cold, wet ground and strong winds.

Lights

Lights may be used as a means of lengthening the day and thus increasing feed consumption and egg production. Information on the use of lights is available at your county extension agent's office or from your College of Agriculture at Lincoln.

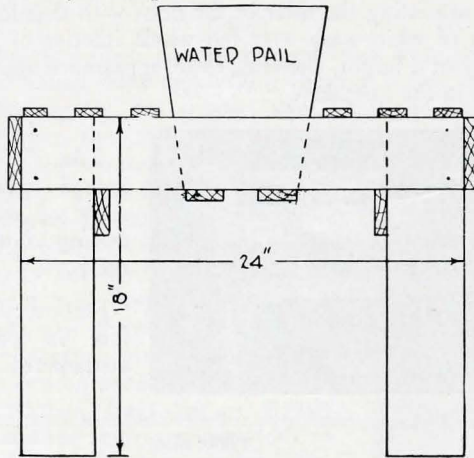
Feeding Schedule

In addition to having good feeds, one should feed properly. Avoid sudden changes in the feed which may throw the chickens off feed and out of production. Feed grain sparingly in the morning and generously in the evening. Usually the evening grain feed amounts to about twice as much as is given in the morning. Germinated oats or some form of succulent green feed may be fed about the middle of the forenoon in the winter time. As much wet mash as the hens will clean up in about ten minutes may be fed them in open hoppers on top of the dry mash. Do not make the wet mash sloppy. Keep dry-mash hoppers open so that hens may have access to them at all times. Maintain a regular feeding schedule.

Feeding Milk

Whenever milk is available as skim milk or buttermilk, it is recommended in the poultry ration. Milk is an easily digested, highly nutritious

feed. The use of milk makes less protein concentrate, such as meat meal and fish meal, necessary. It is a means of lowering the cost of feed. Milk may be kept before the fowls at all times. Where this is done, very little, if any, water is necessary. Feed milk in protected, filth-proof feeders and keep them clean. Use earthenware crocks or wooden troughs, not metal containers which may form poisons.



A stand for the water bucket.

Water

Water is essential to the digestion and makes up 66 per cent of the egg. A good egg machine will require about 150 pounds of water per year. In the winter time either keep slightly warmed water before the birds through the use of a warming device or water them at frequent intervals with fresh, warm water.

Greens and Other Feeds

The hen will use about 15 pounds of green feed per year, about 3 pounds of oyster shell, and 2 pounds of grit. Green feeds supply fiber or essential bulkiness to the feed, vitamins, some minerals, and other growth and health promoting properties. Oyster shell or limestone supplies material for egg shells and the building of bone. Grit is for grinding the feed. It will not take the place of oyster shell nor will oyster shell take the place of grit.

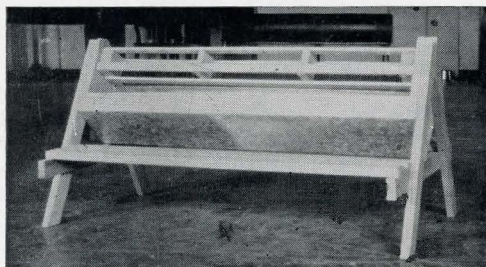
Equipment—Its Use and Care

Time is money and whenever inexpensive and time-saving equipment can be used profitably, such use is recommended. It is poor economy to have fewer nests than are needed. Unless there are plenty of nests, eggs will be broken and soiled.

Clean out litter and droppings at frequent, regular intervals. In the winter time it may be necessary to change the litter more frequently in order to maintain dryness.

Paint the roosts with a good wood preservative several times during the year to repel mites. Use nicotine sulfate on the roosts every few months to drive away lice. During the spring and summer, when the hens can be out of the house, give it a thorough scrubbing and spraying. Use hot lye water generously. Spray with a good disinfectant and open all doors and windows so that odors may not be retained to impart undesirable flavors to eggs. Avoid saturating the litter in the nests with disinfectants.

A good coat of white-wash over the whole interior of the house and all equipment gives a bright, cheerful, clean appearance appreciated by the chickens as well as the caretaker.



The "V" shape feed trough made in various sizes of either metal or crating lumber $\frac{3}{8}$ inch thick.

Features: light in weight, low in cost, practically waste proof, and dirt proof.

	Pullet size		Hen size	
	Metal trough	Wood trough	Metal trough	Wood trough
Inside of trough	4½"	5"	6¼"	7"
Extreme length of end piece....	10½"	11"	14"	14"
Width of reel core.....	2"	2"	2¾"	3"
Width of lip.....	1½"	1¾"	2¼"	3"
Head space between lip and reel adjusted to about.....	1½"	2"	2½"	3"
Length of leg braces.....	14"	14"	20"	22"
To cut legs lay square.....	7¼ x 17"	10 x 17"	8¾ x 20"	12 x 22½"
Height of jump board from floor	9"	9"	9"	11"

Hen Management

Watch the layers carefully and remove any pullets that do not come into production before December 1. If they have not laid by this time it is doubtful if they will become profitable producers.

Keep visitors, dogs, cats and any other disturbances out of the poultry house. When hens reach a fairly high state of production, they are nervous and easily upset. A good poultryman always knocks on the door before entering the building in order to warn the fowls of his visit.

Remove sickly or diseased hens promptly. Such birds are dangerous to the rest of the flock and their presence should not be tolerated. If, after a few days of good care in isolation, they do not show improvement, kill and burn them.

If after two or three months of production some birds persist in laying small or undersized and undesirably shaped eggs, try to discover the ones doing this and remove them from the flock.

Pullets that become fat and coarse after a few months of production may be removed as soon as discovered since they are of doubtful value as layers.

Cull daily. As often as individual birds are observed to be poor layers or poor risks for any other reason, remove them promptly. Remove culls through the use of a catching hook. Simply take out the culls and do not disturb the rest of the flock.

Eggs

Gather eggs several times daily to prevent them from heating, freezing, or breaking and soiling other eggs. Store them in a cool place where they will not evaporate rapidly. It is a good plan to sort and grade eggs as they are brought in from the poultry house. Eggs are graded according to quality, size, and appearance.

Keep eggs clean. Clean litter, clean yards, and protected manure pits or dropping boards will prevent hens from tracking dirt into the nests. Keep layers out of the mud. Closing the nests at night will keep the hens from roosting in them and dirtying them in this way. Whenever an egg is broken in a nest, remove the soiled nesting material and replace it with some that is clean. Eggs that are slightly soiled may be cleaned with a damp cloth or with steel wool. Rather than market dirty eggs, wash them.

Market eggs often. If possible, sell once a week in the winter time and several times a week during warm weather. Produce infertile eggs whenever eggs are not intended for hatching. Male birds keep eggs fertile and fertile eggs will not keep. Avoid storing eggs next to kerosene, onions, stock dip, tankage or anything else that will impart odors to them. Do not use medicated, artificial eggs as nest eggs. Eggs absorb the odors of such things.

Store eggs in clean cases and fillers. Neatness, cleanliness, and attractiveness are essential in selling. Grade eggs according to U. S. standards; they will probably be sold according to such standards.

Records

In order to measure the progress made in the poultry venture keep records of: (1) daily egg production, (2) death loss, (3) weekly egg and poultry prices, (4) price of each batch of feed purchased or mixed, (5) amount of feed consumed—both grain and mash, (6) the approximate number of hours of labor required to care for the flock.

Weigh some of the hens every few weeks and see that their body weight is maintained. If they have gone down in weight, feed more grain.

Appearance

Good appearance is good advertising. Keeping things neat and attractive



*Liquidate the rooster;
produce infertile eggs
for market.*

inspires admiration, respect and confidence and these go a long way toward making the venture successful.

BROILER PRODUCTION

Because successful poultry keeping necessitates the use of every possibility of profitable returns, broiler production cannot be ignored. In certain sections the production of broilers has become a well established business. An area along the Atlantic coast which raised one million broilers in 1930, raised forty million in 1940. A business that expands forty times in 10 years certainly must have encouragement in the way of profit.

A study of broiler raising along the Atlantic coast brings to light a number of interesting practices that broiler producers of the Midwest must consider in order to compete successfully. For example, producers cannot take risks with pullorum. Consequently, breeding flocks are very carefully tested, checked, and retested and rechecked by well trained, experienced technicians to eliminate every possibility of this disease.

Selection of Broiler Breeding Stock

Eastern producers know that broilers must have the ability to use feeds efficiently in order to make rapid gains. This means that breeding stock

In farm flocks where only cockerels are sold as broilers, they may be thinned out and grown out in the brooder house as soon as the sexes are separated and the pullets taken to the range.



must possess *size* and *vigor* and the proved ability to transmit these characteristics to the offspring.

An important quality factor is *feathering*. Slow feathering can be controlled in large measure through the selection of breeders which as chicks showed early, rapid, and complete feathering. Crowding or too much heat may sometimes be responsible for poor feathering. Finely ground, incomplete feeds, lacking fiber, digestible nutrients, and minerals, may cause poor feathering. Feeding and management practices that help control cannibalism will also help develop good feathering.

Production Records

The following financial report is a record of achievement in 1941 on a farm near Crete. The work was done by a high school boy, under the supervision of R. W. Canada, instructor in vocational agriculture. In all 21,000 broilers were produced under Mr. Canada's supervision in 1941.

EXPENSES:

356	Baby chicks (White Rocks).....	\$ 26.65
	Transportation	1.00
400 lbs.	Starting mash	8.40
2100 lbs.	No. 8-S mash	29.10
120	Gallons distillate.....	8.40
530 lbs.	Coal	3.46
1176 lbs.	Cracked corn	10.50
76	Gallons buttermilk.....	1.14
	Taxes and depreciation (6% of \$50.00).....	3.00
	TOTAL	\$ 91.25

RECEIPTS:

855 lbs.	Broilers @ 19c per lb. (300 birds).....	\$162.35
	Replacement: 38 chicks @ 7.5c.....	2.85
	TOTAL	\$165.20
	Student labor income	73.95
	Labor: 94 hrs. @ 12½c per hr.....	11.75
	NET PROFIT	\$ 62.20

ADDITIONAL OBSERVATIONS:

1. 855 lbs. produced for a feed cost of \$49.14.
2. Average number pounds of feed per pound of gain: 4.3 lbs.
3. Buttermilk per pound gain for fattening period: 0.73 lb.
4. Pounds of feed per bird raised: 12.25 lbs.
5. Average weight 2.85 lbs. per bird at market time.
6. Fuel cost per bird: 0.039c.
7. Total hours labor to produce 855 lbs: 94 hrs.
8. Returns per hour of labor: 78c.
9. Profit per bird produced: 2.07c.
10. Profit per pound produced: 0.72c.
11. Size of brooder house: 10' x 12' (insulated).
12. Litter used: Sand and straw from home farm.
13. Per cent of birds raised: 86 per cent.
14. Cost of production per 100 lbs. (labor included) \$12.00.
15. Cost of production per 100 lbs. (labor not included) \$10.60.

Mass Production

Broiler production has been developed on a large-scale all-year basis which permits all-year use of the same equipment. This reduces overhead and the unit cost of production. Large-scale operation also permits efficient procurement of feed, fuel, litter, and other materials and equipment. It is difficult for small-farm producers, having a few broilers during a short season, to compete with large producers operating on an all-year basis.

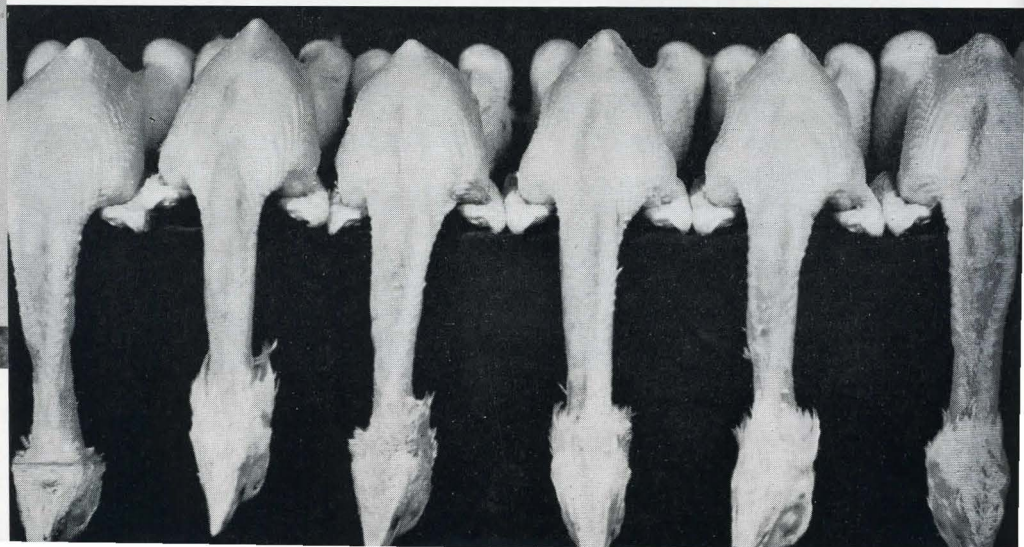
In large-scale modern broiler production both sexes are generally used, and the chicks are encouraged to run outside as early and as much as the weather permits in order to grow out their feathers.

By improved management, brooding, and feeding, and by pooling resources, orders for chicks, feeds, equipment, and other materials, small producers may have greater assurance of success. Preceding and supporting this form of cooperation comes the matter of breeding flock selection, pullorum control, and hatchery cooperation. It can be done, and it must be done if Midwest poultry raisers are to capitalize fully on the poultry venture.

Surplus cockerels when separated from the pullets as early as possible and fed out to weights of from 2 to 4 pounds in 8 to 16 weeks can frequently be sold locally to good advantage. This is especially true of well fleshed, well feathered, tender-meated birds. Leghorn cockerels up to 2½ pounds make excellent broilers, provided they have been properly fed and have attained this weight at 10 weeks.

In order to make a profit as broilers, Leghorn cockerels are usually marketed when 9 to 10 weeks of age. Cockerels from heavier breeds are usually marketed at about 12 weeks of age. The following table shows how the cost of broilers is affected by feed prices:

Cornish-Leghorn broilers weighing two pounds each at eight weeks. In this cross, note the good fleshing of the Cornish and good feathering of the Leghorn. Both sexes of this cross are marketed.



No. of weeks required	Wt. of broilers	Costs of chicks, labor, fuel, etc.	Amount of feed	Total accumulated costs with feed at varying prices per lb.			
				2c	2½c	3c	3½c
	<i>lbs.</i>	<i>c</i>	<i>lbs.</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
10	2	16	7	30	33.5	37	40.5
12	3	18	12	42	48	54	60

TURKEY PRODUCTION

Turkey production represents one of Nebraska's most recently developed farm industries. With only two unprofitable years (1932 and 1936) out of the past fifteen, the possibilities for a labor income from turkeys compare favorably with other farm enterprises. Production figures for Nebraska for the past four years are as follows: 1937, 460,000; 1938, 600,000; 1939, 960,000; 1940, 1,290,000. It is estimated that the 1941 figure will be 1,500,000.

Since much of the same equipment and the same kind of feed used for chickens can also be used for turkeys, farmers may find it profitable to include them in their program.

According to cost-of-production figures compiled from producers' records, turkey production costs vary from 9 to 16 cents per pound. An important factor influencing the cost of turkeys is the percentage raised. Turkey producers are now striving to raise 90 per cent of their birds. When losses are much more than 10 per cent, growers may find that their work and risks have been without profit or labor return. As the turkey production program becomes more definitely established, more producers will keep their own breeding flocks.

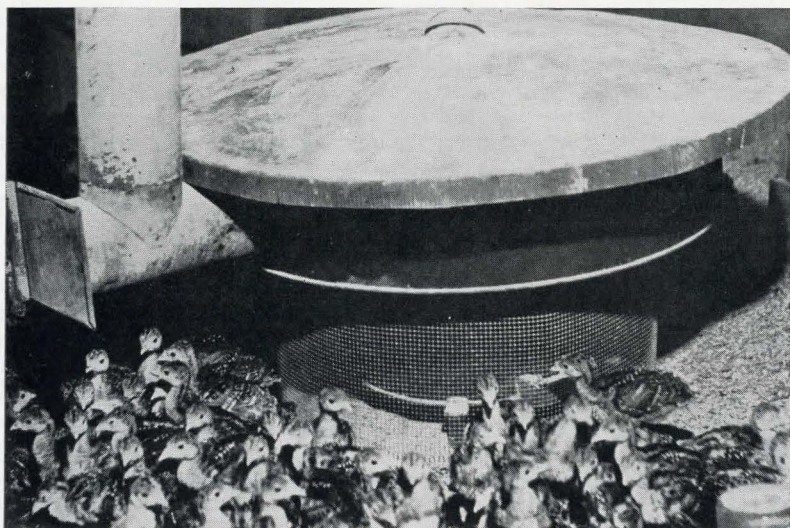
Efficient feeding and maximum use of inexpensive home-grown feeds must be considered. Upon the assumption that growing turkeys use about 40 pounds of mash, it is interesting to note that one cent's difference in the cost of a pound of mash makes nearly three cents' difference in the cost of producing a pound of turkey.

Unnecessary costs, whether in the procurement of poults, feed, or equipment or the use of them, must be prevented. In this connection, it should not be necessary to warn turkey growers against attempting to raise turkeys without a certain amount of protection and shelter against storms. Some protection may be had at slight expense when turkeys are ranged in sheltered areas such as corn or grain sorghum fields, or in wooded shelterbelts. Turkey growers might well investigate insurance.

Turkey Improvement

For several years a new meat-type turkey has held the attention of progressive turkey growers. This heavy-meated or broad-breast type of turkey is being developed to the point where it not only makes a far more attractive and plump carcass, but it is matured in a shorter period of time and with less feed than is usually required for finishing turkeys.

Turkey-grading schools have aided in both the production and marketing of quality turkeys. These have helped producers learn the character-



Poults are often started in kerosene and coal-burning brooders.

istics of finished market turkeys, and this has kept off the market the unfinished, poorly fleshed, pin-feathery birds which, of course, would go into lower grades and sell at lower prices. Grading dressed birds has been a definite help in pointing out the advantages of selecting certain types of well fleshed, early maturing birds. The old custom of selling off the best turkeys first and continuing until finally the leavings or scrubs are left as a breeding flock has given way to a far more progressive plan which requires that superior birds be selected for breeders before any go to market. Superior birds are those that possess full fleshing, are free of pin feathers, and are fat and ready for market in the shortest period of time (24 to 26 weeks).

The size of Nebraska turkeys has steadily increased for the past several years. Five years ago the average weight of birds shipped through co-operative marketing associations was less than 13 pounds. Today the weight is around 16 pounds. Since large birds are being discriminated against by family buyers, it appears that greater emphasis may in the future be given to the production of smaller turkeys.

The popular breeds of turkeys and their standard weights follow:

	Mature tom	Young tom	Mature hen	Young hen
	<i>lbs.</i>	<i>lbs.</i>	<i>lbs.</i>	<i>lbs.</i>
Bronze	36	25	20	16
Bourbon Reds	33	23	18	14
White Holland	33	23	18	14
Narragansett	33	23	18	14
Slate	33	23	18	14
Black	33	23	18	14

Recommendations

Any farmer can raise turkeys successfully, provided: (1) Poults are hatched in incubators (many risks are associated with natural incubation such as lice, disease, etc.). (2) Poults are brooded artificially in clean houses equipped with graveled, screened, or slatted corrals or yards until 8 to 10 weeks of age. (3) Only half as many poults as chicks are brooded in one brood. (4) Turkeys are raised on clean ground where chickens have not been kept for several years. (5) Turkeys and chickens are kept apart. (6) A full and complete ration is maintained. (7) Turkeys have access to good green feed, preferably alfalfa, at all times. (8) That every precaution be taken to insure clean feed and clean water in clean containers and on clean range.

If the brooder house used for chickens early in the spring is thoroughly cleaned and moved to clean ground it may be used for brooding poults late in the spring. The same brooding and feeding principles and practices are followed for both chicks and poults.

Since young turkeys can use more protein than is normally fed to chicks, many growers prefer to give them a richer feed in order to stimulate faster growth (see page 60).

Turkeys are usually ready for market at 26 to 28 weeks of age. Since feed consumption increases greatly and little market improvement is made after this age, it is good management to keep the marketing date in mind when hatching or buying poults. Well-fed young turkeys usually average around 14 pounds each at market time (26 to 28 weeks). Feed consumption at this age usually totals about 70 to 80 pounds each or about 5 to 6 pounds of feed per pound of turkey.

Nebraska Turkey Cost Account records indicate that turkey producers interested in keeping costs low obtain poults in the order listed: (1) owning a breeding flock and producing eggs and poults, (2) buying eggs and hatching them or having them hatched, (3) buying day-old poults.

Young turkeys are generally considered more difficult to raise than chickens. This makes clear the necessity for maintaining sanitation at all times with full realization that there is no substitute for it.

Brooding Poults

When about 24 to 30 hours old, poults are usually ready to be moved from the incubator to the brooder. Poults are brooded in exactly the same way that chicks are brooded. A clean, warm brooder house with clean litter and equipment is the first requirement. The temperature of the brooder should be about 95° to 100° F.

Since young turkeys are clumsy, the litter should be reasonably fine and smooth. For the first few days a corral should be provided to keep the poults from straying too far from the heat. This may be made of corrugated paper or other inexpensive material. A sloping board around the outer edge of the floor and against the studding will lessen the danger of piling and smothering.



This feeder is not completely sanitary. When both feet get in the feed trough, health troubles are almost sure to follow. Wires shown here, called "tooth picks," are purposely provided for turkeys to use in cleaning sticky feed from their beaks. Without the wires, feather picking would more likely occur. Coarse feed also lessens feather picking.

Brooder-age poults require careful handling and management to prevent crowding, piling, and smothering. If too many are brooded in a unit, this danger is much greater. Poults should be brooded in units of about 250 birds. They are less hardy than chicks and therefore must be watched more carefully. Avoid leaving open pails, boxes, or water pans within reach. A pair of old overshoes at the door of the brooder house to slip on when entering will do much toward preventing filth from being tracked into the house. This is done to lessen the danger of tracking in blackhead and other germs from poultry yards.

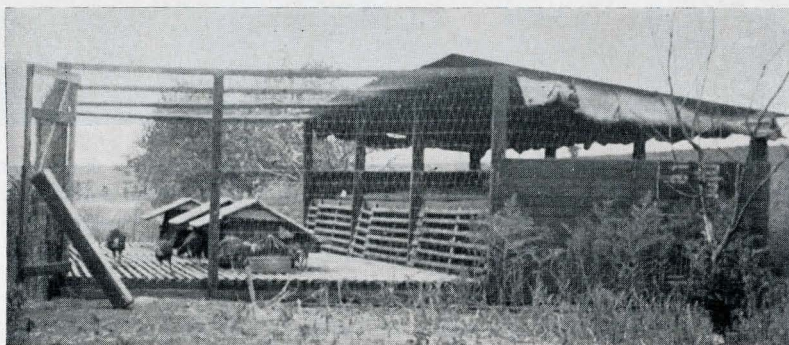
Feeding Poults

Feed and water are given as soon as the poults are put in the brooder. In fact it is good practice to have feeders and waterers filled and ready when the poults arrive. The same feed given to young chicks may be given to young turkeys. Turkeys, however, can tolerate a higher-protein feed and because they respond or grow faster on richer feed, they are usually given special poult mashes containing 22 to 26 per cent protein. This feed is continued until they are about eight weeks of age, or ready to leave the brooder house and go to range. At the time the change is made from brooding to outdoor range, grain is made available in open hoppers. The same kind of feeders, waterers, and feed and water platforms recommended and used for chicks are also recommended and used for poults. Provide about 15 feet of feeder space for 100 poults.

Because turkeys are usually fed richer feeds and grow faster, the danger of rickets and vitamin D deficiency is greater. To insure proper mineral fixation and bone development a good grade of suitable fish oil is included in the poultry ration until the eighth week.

Summer Range for Turkeys

Young turkeys are usually removed from the brooder house at about 8 to 10 weeks, or when well feathered. About one acre of good pasture per 100 turkeys should be provided. Sudan grass sowed early and mowed about the time the turkeys are put out makes an excellent supply of tender green feed. Alfalfa, sweet clover, and rape are also good. Cut-over grain fields, frequently used, are satisfactory provided green feed is available. Corn and grain sorghum fields make excellent range for turkeys.



Comfort and protection for growing turkeys on range will do much toward making the venture successful. Note shade and shelter-shed roosts with sanitary corral and weather-proof feeders.

Good pasture reduces the mash and grain requirement, speeds growth, and makes turkey production more economical and profitable. An ample supply of green feed provides bulk, which seems essential in feeding turkeys. Good range with plenty of green feed is about the best-known means of preventing feather picking, which once started is difficult to control.

Turkeys will consume quantities of live grasshoppers, but for best results such a diet must be supplemented with other feeds. All that grasshoppers provide nutritionally is also provided in the tender green grass.

Successful turkey growers supply sufficient feeders from the time the turkeys go on range until they are ready for market. This means of course that more and larger feeders are used as the turkeys grow. Small feeders make sanitation much more difficult. An excellent feeding practice is to put out fresh feed daily but never fill the feeders more than two-thirds full. Screen- or slat-covered platforms are recommended for feeders and waterers.

Because turkeys drink so much water in the summertime, many turkey growers find it convenient to supply water on a quantity basis. Barrel



Part of a 10,000-bird flock of Nebraska turkeys showing a popular double-roost shelter arrangement which is fine in fine weather but lacks sufficient protection in stormy weather.

waterers equipped with automatic or self-controlled faucets are proving quite satisfactory. For comfort and uniform growth it is recommended that a number of feeders and waterers be kept in the shade.

Shelter and Shade

A comfortable roosting place that will keep off rain and hailstorms and protect the turkeys from natural enemies will do much to insure a more successful turkey-production venture. Efficient, inexpensive shelter sheds with a one-way board roof slanting north and with roosts underneath may be made out of ordinary posts, poles, and car siding. Satisfactory shelters have been covered with straw.

In areas where no natural shade is available it is good management to provide it. In extremely hot weather, young turkeys will seek the shade if any is available and will frequently crowd each other if it is not ample. Young turkeys will grow faster and more uniformly when feed and water are kept in the shade. Skeleton racks covered with straw, hay, or burlap make effective and inexpensive shade.

Finishing Turkeys for Market

The methods and feeds used when turkeys are put on range may be continued until market time. As turkeys approach maturity, they will consume increased quantities of grain. For the first three months turkeys will use more mash than grain, whereas during the next three months

they will consume more grain. As the weather gets cooler their appetite for grain increases.

Either ordinary mash, such as 8-S, or a good 30 per cent protein concentrate may be fed along with grain. The turkeys will make their own adjustments and apparently do as well as with any other system of managed feeding.

About the time turkeys are approaching market age and when young toms are strutting around more than usual, there appears to be a greater tendency for feather picking. This is much more noticeable when they lack a complete ration. If they have access to plenty of coarse feeds, alfalfa hay, or growing green crops, feather picking is usually not common. Wet mash or soaked grain is sometimes fed to hasten the finishing process.

Marketing Turkeys

The most important factor in marketing turkeys is in the selection of birds ready for market. This means the selection of birds which have matured early and are well fleshed, well covered with fat, and free from pin feathers. Skin bruises in live birds at dressing time usually become green spots in the dressed carcass later. It is very important that they be handled carefully. Starve turkeys one day before slaughtering in order to clean out feed.

Hints on Cooperative Marketing of Turkeys

Work to be done:

1. Organize association articles, by-laws, directors, incorporation.
2. Call meetings and make necessary explanations.
3. Secure marketing agreements (membership).
4. Send marketing notices and information to growers.
5. Determine total number of birds to be dressed.
6. Secure, check, and supervise labor, equipment, materials, grading, cooping, transportation, dressing, labeling, packing, and loading.
7. Catch, grade, coop, and load turkeys on farm.
8. Arrange transportation to dressing plant.
9. Count, record, and mark each grower's turkeys.
10. Kill, bleed, and clean up daily.
11. Do semi-scalding and rough picking.
12. Pick, clean, and cool in water.
13. Rack, cool, and wrap heads.
14. Grade and record each grower's grade.
15. Pack and load.
16. Secure refrigerator cars when needed.
17. Deliver to railway and sales agency.
18. Record local sales.
19. Pay growers at time of delivery.
20. Keep time and work record of labor.
21. Make out payroll and pay help.
22. Keep accurate ledger.
23. Compute and prorate costs.
24. Compute and prorate final payments.
25. Do efficient work and keep down costs.
26. Build grower and consumer confidence.
27. Adopt and develop brand name and trade mark.
28. Obtain insurance covering property and compensation.
29. Arrange for warehousing facilities.

For further and more detailed information on processing and marketing turkeys, see Farmers' Bulletin 1694, U. S. Department of Agriculture, "Dressing and Packing Turkeys for Market." See your local county extension agent or write to the College of Agriculture for information and demonstrations pertaining to selection, processing, grading, packing, and cooperative shipping.

Economics of Turkey Production ¹

In response to requests from people without experience or knowledge in modern methods of turkey production, but who are considering this field as producers or as credit agents, this brief outline of factors affecting the cost of production has been prepared.

In the following estimates, two types of flocks are considered, the commercial flock, composed of 2,000 to 3,000 turkeys which create a full-time job for one man, and the smaller flock as a part of the operations for a family-sized farm. The size of such flocks depends upon the family labor available for this job, the equipment, the cash or credit to see it through, as well as the expected production of grain, forage, and skim milk which may be assigned to the turkeys. In either case, the type of turkey raised, the time hatched, the rate and efficiency of growth, and the age, condition, and methods of marketing must also be considered.

Estimates of cost of production may vary greatly from one year to another. New or remodeled equipment should be amortized within five years. Expenses will increase greatly should the death rate be higher than 20 per cent of the poults started, and since few producers succeed in keeping all items of expense to the lowest level, it is suggested that plans be based on averages.

In case financial assistance is necessary to carry on the project, records showing efficient production are of great value in securing loans.

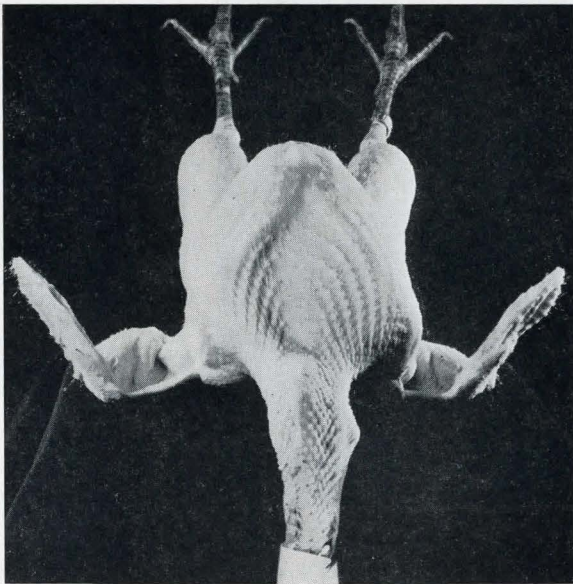
¹ Prepared by J. H. Claybaugh.

Spring brooder houses become good summer shelter sheds on this farm in Thayer County.



*Estimated Cost of Growing Turkeys, with Labor and Transportation
Costs Omitted*

Factors	Low estimate	High estimate
Poult cost per turkey raised (25% more than amount paid for poults when 80% of poults are raised)....	\$.45	to \$.60
Feed cost for a 15-pound live weight average		
(a) 40 pounds of mash (@ 1½c to 3c per lb.).....	.60	to 1.20
(b) 34 pounds of grain .....	.34	to .45
Fuel, litter, gravel .....	.02	to .08
Interest and depreciation on equipment (26% charge) .....	.025	to .23
Land rental including preparation and seeding .....	.005	to .04
Interest .....	.02	to .06
Insurance .....	.03	to .05
Estimated expenses (not costs) per bird	\$1.49	to \$2.71
Estimated expenses per pound live weight.....	.099	to .168
Av. of these two estimates—\$2.22 per bird or 13.8 cents per pound.		



Broad-breast type turkeys are preferred because they have more slicing white meat.

The Turkey Breeding Flock

When no artificial lights are used, hens usually begin to lay during March and are marketed by June 1st. A conservative estimated production from 100 turkey hens and 8 toms is 4,000 eggs, which should produce 2,500 poults. The 1939 death loss and depreciation on such a flock averaged

\$109.00, while the feed cost averaged \$150.00. This is a cash expense for producing turkey eggs of about $6\frac{1}{2}$ cents per egg. At 4 cents for 4,000 turkey eggs, the bill for custom hatching would have been \$160.00. The cash expense for each of the 2,500 poults would then amount to $16\frac{3}{4}$ cents.

Other costs such as breed improvement, capital, risk, labor and advertising, not to mention profit, are items responsible for the fact that turkey poults sell for 30 to 50 cents each. These are the chief reasons why the farmer who considers turkey production a regular part of the farming program usually keeps his own breeding flock and operates his own incubators.

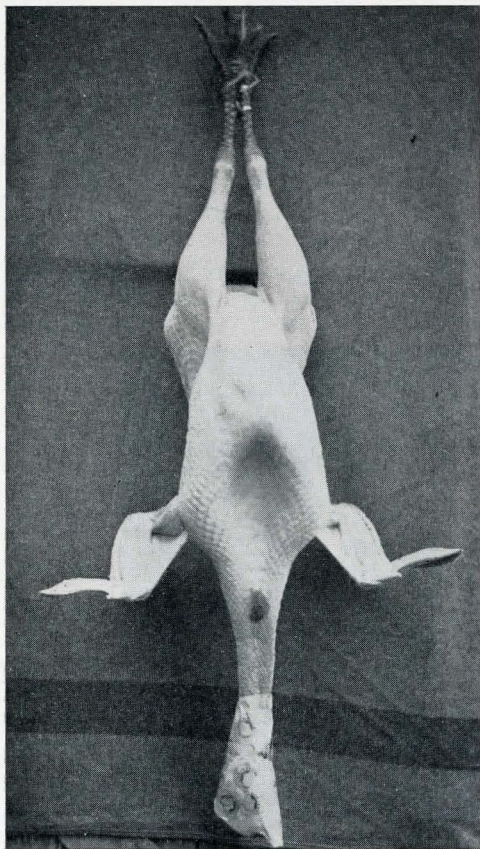
Where breeding stock is kept, the grower has control over breed improvement and knows from the start the type of turkey he is producing, and can breed for best market type.

To be successful with a breeding flock, the grower must become a health officer, understand nutritional requirements, assume risks of poor hatches, and be willing to cooperate in forming egg pools so that each member is able to start units of poults all of which are from the same hatch.

Watch Feed Costs

There is no "best" formula for mixing feed for turkeys. Tested formulas are widely known and easily secured. After turkeys are on range, changes from one good formula to another do no damage if the texture of the mixture remains similar.

Buying feed on the open-formula basis allows the grower to take advantage of seasonal price changes of various ingredients.



At 26 weeks, this young Nebraska broad-breast tom dressed out 26 pounds of "U. S. Prime" grade turkey. Gains were made at the rate of about four pounds of feed per pound of live weight. Not all gains are so economical, but more could be through the selection of better breeders and more efficient feeding and management.

Many Nebraska elevators and mills supply grinding and mixing services at nominal charges above wholesale prices of ingredients.

Ton lot purchases of protein concentrates with which whole grains are mixed permit the farmer to use a maximum amount of unprocessed whole grains for turkey feed. After the poults are 8 weeks old, whole oats, whole wheat, or whole kafir can be added to the protein concentrates to advantage.

Less feed blows out of the feed troughs and there is less cleaning of beaks on the feathers of other birds when the mixture contains whole grains and coarsely ground corn and alfalfa.

The estimated amount of feed required by a flock of turkeys each month may be figured from the following table.

Month	Poults	Mash per		Grain per	
		Bird	Flock	Bird	Flock
	No.	Lbs.	Lbs.	Lbs.	Lbs.
May	125	1.6	250	...	...
June	115	4.8	552	0.50	58
July	110	7.6	836	2.25	247
August	106	10.0	1060	6.25	662
September	103	9.0	927	10.00	1030
October	100	7.0	700	15.00	1500
TOTALS		40.0	4325	34.00	3497

The 4,325 pounds of mash would contain 432 pounds of oats and 1,080 pounds of corn. The 3,497 pounds of grain would contain about 960 pounds of oats and 2,537 pounds of corn, barley, or kafir.

For each 100 turkeys raised, figure 44 bushels of oats, 65 bushels of corn or kafir, 432 pounds of alfalfa meal, and 2,381 pounds of supplement. When these are produced on the farm, cash expenses are greatly reduced.

Another favored way of reducing cash feed expenses is to adjust the size of the turkey flock to the skim milk supply. This often limits the size of the flock. The feeding of milk to turkeys during hot weather involves considerable labor and increases the tapeworm hazard by attracting flies to the turkey yard. In spite of these difficulties, the soaking of barley or oats in milk is a practical method of reducing the amount of mash purchased.

Equipment Costs Vary

One great variable in the cost of producing turkeys is the charge for equipment. This may not always be a cash expense. Where flocks are large, the cash expended for new equipment the first few years may be greatly increased. This is illustrated by noting the equipment needed for a brood of 2,500 poults where old buildings are to be remodeled for brooding.

10 new brooder stoves at \$25.00 each	\$ 250.00
Material for 10 sun porches at \$20.00 each	200.00
80 small chick feed troughs for starting at 25 cents each	20.00
80 small waterers at 15 cents each	12.00
80 medium-size feed troughs at \$1.50 each	120.00
25 two-gallon waterers at \$2.00	50.00
50 six-foot feed troughs at \$2.00 each	100.00
10 waterers 10 feet long at \$5.00 each	50.00
Water wagon or reserve water tanks	75.00
8 shade shelters and roosts at \$40.00 each	320.00
TOTAL	\$1,197.00

If 6 per cent interest and 20 per cent depreciation on this investment is charged, we have a cost for new equipment of \$311.22 or 15.56 cents per bird raised.

How Much Expansion?

Those planning to produce turkeys must also consider the rapid expansion that has occurred during the last few years and adjust their costs to meet the declining price level. Study these figures:

Geographic divisions	Number Raised			No. on hand Sept. 1, 1940, in per cent of 1939	Indicated number raised in 1940 ¹
	Average 1932-36	1938	1939		
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Per cent</i>	<i>Thousands</i>
North Atlantic	1,222	1,661	2,072	98	2,041
East North Central . . .	2,005	2,692	3,370	111	3,743
West North Central . . .	6,480	7,829	10,225	104	10,622
South Atlantic	2,090	2,166	2,548	103	2,624
South Central	6,123	5,869	6,670	94	6,299
Western	5,161	6,062	7,847	99	7,809
United States	23,081	26,279	32,732	101.2	33,138
Nebraska	483	600	960	125	1,290

¹ Indicated by change in numbers reported in sample flocks on September 1, 1940.

CAPON PRODUCTION

The poultry raiser, whether on a Nebraska general farm or on a specialized poultry farm, who cannot meet the conditions given below should sell the surplus cockerels as broilers and not consider caponizing. The market demands heavy birds and the person who cannot produce seven- to ten-pound capons by the time the birds are from eight to ten months old will be disappointed in the returns he will get from those he does produce.

The conditions which are important are: (1) Big, strong, healthy, early-hatched cockerels to caponize. (2) House room and range to care for the capons for six to eight months after the cockerels might have been sold. (3) Habitual good feeding and regular attention—plenty of grain for normal growth to 7 to 10 pounds by late winter.

Average Person Can Caponize

Capons are to the poultry industry what steers, barrows, and wethers are to the other livestock industries. The procedure in caponizing a young cockerel may seem somewhat more difficult to the beginner than castration of larger animals but it is not an impossibility and many poultry raisers have been able to do their own work with very little loss. The suggestions and directions in the following paragraphs are taken from practical experience. Any person with average skill should be able to follow them and become quite successful with some practice.

Selection of Birds

The cockerels to be caponized should be the largest and strongest ones in the lot, never the culls that are left after the good ones are sold. They

should be from 4 to 8 weeks old, weigh between 1 and 2 pounds, and be just at the stage where the comb is beginning to develop. Light breeds do not make profitable capons as they will not grow large enough to meet the market demands.

Starve Birds Before Operation

Since the testicles of the cockerel are inside his body and close to his intestines, it is absolutely necessary that the cockerels to be caponized be starved for 36 hours before the operation is performed. Shut the cockerels up in a clean, well ventilated coop one evening, leave them there without feed and water all the next day and that night, and caponize them the morning of the next day. It takes this long to empty the intestines of a young cockerel and he will not suffer from the starving. Keeping water from them also tends to thicken the blood and prevents excessive loss of blood.

The Tools to Use

There are several commercial sets of caponizing tools on the market which can be purchased at reasonable prices. There are no makeshifts or home-made devices that will take the place of them. All have good sets of directions which can be followed in carrying out the operations. Electric caponizing instruments are gaining some recognition although many experienced caponizers prefer the old sets.

Growing Out Capons

Ordinary dry mash that is used for hens, plus some scratch grain, cracked corn, and oats or wheat, is a satisfactory feed for capons. If the flock is well taken care of, the capons may be allowed to run with the flock, but in no case should they be turned loose, forgotten, and allowed to shift for themselves. As was stated in the beginning, too often Mr. Capon comes into the hen house when winter comes, thin in flesh, small in size, and with little promise of ever becoming a desirable product.

Capons are ready for market when 8 or 9 months old. At that time a capon should have cost the owner about half what it takes to feed a hen for a year, say 45 to 50 pounds of grain and mash, plus the cost of the chick at the start, the brooding and housing expense, the labor, and the caponizing expense.

A well finished capon should weigh about 10 per cent more than the normal weight of the cockerel for the breed. He should be plump and well muscled and make an attractive dressed chicken for a special trade.

Before attempting to do caponizing it is suggested that arrangements be made with the county agricultural agent or vocational agricultural teacher for demonstrations.

MARKETING LIVE AND DRESSED POULTRY

Efficient marketing of farm products deserves more attention. As a matter of fact, much of the effectiveness of careful production may be lost through careless marketing. Flock owners in the Nebraska Cost Account

Project who have realized the most profit from poultry have done so because of efficient marketing.

Marketing represents the processes through which products go enroute from original producers to consumers. It consists of a series of services which must be performed regardless of who does the marketing. Usually these services are distributed among several agencies.

The Services of Marketing

These services are usually considered essential in the marketing process:

Assembling.—First step in orderly marketing.

Processing.—Fattening, killing, picking, and canning.

Grading.—Sorting, classifying according to quality, size, age and sex.

Packing.—Processing in some cases. Making ready for shipment.

Storage and refrigeration.—Surplus products are stored for distribution during the period of slack production.

Transportation.—Hauling from assembling and processing plants to consumers.

Risk assumption.—Not all risks are covered by insurance.

Wholesale distribution.—Carloads or similar large units must be divided into smaller units that the average retailer can use.

Financing.—Someone has capital invested while products are being marketed.

Merchandising and retailing.—Displaying, selling.

Wherever chickens are raised, market poultry is produced. In many instances, it may be a by-product incidental to the production of eggs and yet it may be a highly developed phase of the poultry business such as in commercial production of broilers, capons or turkeys.

Classes of Market Poultry

For the most part, farm raised poultry is sold alive and divided into the following classifications:

Broilers.—Young chickens, approximately 8 to 12 weeks old, of either sex, weighing about 2 to 3 pounds, and sufficiently soft meat to be cooked tender by broiling or frying.

Fryers.—Young chickens, approximately 10 to 20 weeks old, of either sex, weighing over 2½ pounds but not more than 4½ pounds and sufficiently soft meat to be cooked tender by frying.

Roasters.—Young chickens, approximately 5 to 9 months old, of either sex, weighing over 3½ pounds and sufficiently soft meat to be cooked tender by roasting.

Stags.—Male birds, of any weight or age, with flesh slightly darkened and toughened and with comb and spur development showing the bird to be in a state of maturity between roasting chickens and cocks.

Cocks.—Mature male birds of any weight with darkened and toughened flesh.

Capons.—Unsexed male birds weighing over 4 pounds, usually 7 to 10 months old, with soft and tender flesh and well fattened.

Slips.—Incompletely caponized male birds, weighing over 4 pounds, with comb, spur, and flesh development similar to stags.

Fowls.—Mature female birds of any age or weight.

Selecting and Grading Live Poultry

Health is the one most essential requirement of all types of market poultry, regardless of classification. Sickly poultry is a great hazard in congested markets because of the danger of spreading disease. It is well understood, of course, that no market demand exists for sickly poultry.

Condition is degree of fattening. Next to health, it is a most important factor. Birds in good plump condition of flesh are most likely to be in good health and in good market demand. Good-quality poultry will increase consumer demand and one of our jobs as producers is to increase the demand for our product. Bright red combs and faces, with bright eyes and a "full of pep" appearance, are usually dependable symptoms of both health and condition.

Plumage is a factor in determining the market value of poultry. Either broken feathers or pin feathers give birds an unattractive appearance when picked, and good food products must look attractive.

Feed in the crop of market poultry will usually result in a price discount. Not many poultry buyers are willing to pay poultry prices for feed. Crops must be empty at the time birds are sold. Starving five to ten hours will usually empty a full crop. A longer starvation period is usually required for birds fed coarse grain.

Scaly legs and feet, as well as feathered legs and feet, may cause the birds to sell at lower prices.

Uniformity of size, color, and condition is important in grading live birds. It is a good plan to handle or coop different classes separately to assure more accurate grading or sorting.

Feeding Market Poultry on the Farm

A question is often asked, "Is it profitable for farm poultry raisers to crate fatten their own poultry before marketing it?"

Conditional answers to this question are: yes, (1) where large numbers of birds are raised; (2) where marketing is done throughout the year; (3) when dressed poultry is sold direct to the consumer.

The available supply of market poultry on the average Nebraska farm is usually too small to justify the little use that would be made of the kind of equipment that would insure satisfactory fattening.

The object of crate fattening is to soften the flesh, add fat, and bleach the bird. Grain-fattened birds are usually harder fleshed and possess more yellow color than some consumers like.

Poultry will tolerate only about 7 to 10 days of heavy feeding of soft feed and after this period the birds may "go off" feed and lose weight. Poultry that has gone through one fattening period will not very well stand another immediately following the first.

A fattening mash commonly used consists of 50 pounds of ground yellow corn, 30 pounds of wheat shorts, and 20 pounds of pulverized oats,

moistened with buttermilk to a consistency about like pancake batter. Birds are fed what they will clean up readily four or five times daily. Feed is put in troughs suspended outside of coops.

Range fattening appears to be quite successful with all classes of market poultry, especially turkeys. When birds are properly fed for growth, the benefits of special fattening with the extra work involved are doubtful. Broilers seem to do exceptionally well when fed the kind of starting and growing mashes that insure fast growth.

Handling Live Market Poultry

Careful handling will do much to insure top prices. Birds with broken legs and wings or other blemishes and bruises due to rough handling go into lower grades and sell at lower prices.

Crowding too many birds into the market coop may result in some being smothered or trampled and scratched so badly that they are almost a total loss. Allow room for all of the birds to stand fairly comfortably in the coop.

Coop size is important in keeping market poultry in good condition enroute to market. The coops should be deep enough to allow the birds to stand, but no deeper. Shallow coops force the birds to rest on the breast, which if bruised results in a lower grade classification. A height of 12 inches is recommended for chickens and 18 inches for turkeys.

In shipping live poultry, it is usually a good plan to consult the buyer and railroad agent regarding details of crating and handling.

Marketing Dressed Poultry

Marketing dressed poultry requires much more experience and special equipment than average producers possess or the size of their poultry enterprises warrants. For large flock owners making a business of selling dressed poultry and for cooperative poultry marketing associations or marketing rings, there are some advantages. Dressing poultry for shipment is a rather hazardous business, and a careful study should be made before dressing is attempted. It would, no doubt, be advisable to arrange for some demonstrations before attempting to dress poultry on a large scale. (See the county extension agent for details.)

QUALITY EGGS

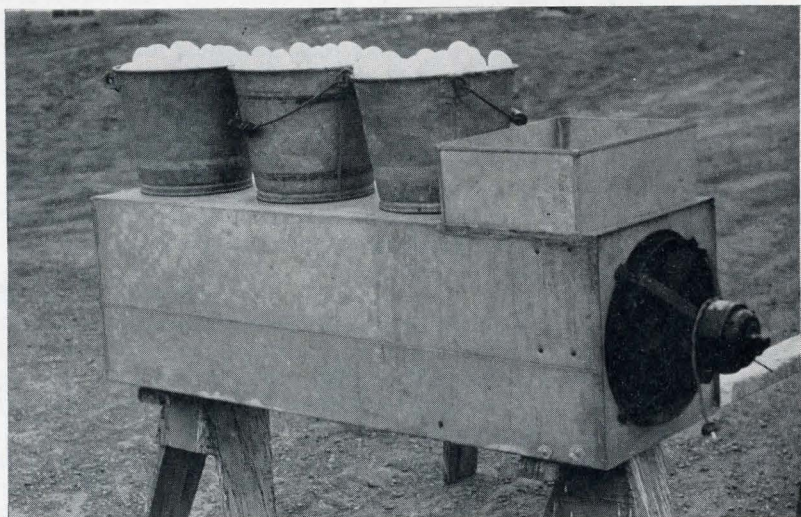
Egg quality is so definitely influenced by production management that no amount of care after the eggs are laid will erase the damage of careless production. As feeds affect the color, so do they affect odor and flavor. For example, hens fed onions produce eggs of an onion flavor. Those fed tankage will produce eggs of a strong tankage flavor, and other feeds of undesirable flavors will impart these flavors to the eggs.

In the same way that feeds affect flavors, storage environment affects eggs. Eggs readily absorb the odors of mothballs, rotten potatoes, onions, rotten tomatoes, turpentine, kerosene, and insecticides. These odors are imparted to the eggs simply by storing the eggs for a few days in close proximity to these various odor products. Certain fresh vegetables and fruits such as cantaloupes and apples will also impart flavors to eggs.

Clean houses and clean nests help insure clean eggs of pleasing flavor. A good management practice in this connection is to see that houses are not allowed to become filthy, that hens do not have an opportunity to walk and wade in filth either in the house or outside and hens must not be allowed to roost in the nests. When eggs are broken in the nest, the whole nest should be thoroughly cleaned and new nest material added.

Egg Cooling Equipment

To preserve quality, eggs, like milk, must be cooled quickly. Another way of saying the same thing is—"Only a cool egg stays fresh." In Nebraska, where the hot weather is aggravated by extreme dryness, another equally difficult problem of the egg producer and the egg merchant is to prevent evaporation.



Air-conditioning equipment for eggs. Water in the square pan drips onto a glass-fiber sponge through which the electric fan drives moist air up through the wire-bottomed pans of eggs—thus cooling but not evaporating them. (For construction details write the Department of Poultry Husbandry, College of Agriculture, Lincoln.)

One simple and very practical method of doing both jobs of cooling and maintaining humidity with a minimum amount of work and equipment is first gathering the eggs at frequent intervals and then placing them on trays arranged over beds of wet sand. A basement or vegetable cellar will make an ideal place for setting up this equipment.

On many farms where electricity is now available, a newer and improved type of egg-cooling device can be made and operated at very low cost. This consists of a rectangular box with an electric fan attached at

one end and blowing air through a water soaked grass fiber sponge and out through openings in the top of the box over which wire-bottom egg baskets are placed. This box can be about 12 to 15 inches square and 4 to 6 feet in length depending largely upon the volume of eggs to be cooled. The glass fiber sponge is kept saturated with a basin of water on the top of the box and arranged so that water drips into the sponge.

There are other types of coolers on the market, or they can be made. About all that can be said about the choice of the various cooling devices is that whatever kind will do the job efficiently is certainly worthwhile.

Merchandising

Consumers have learned to expect almost every item they buy, whether food or not, to be put up attractively. This means the use of clean suitable packaging material in the way of clean cases, clean flats, clean fillers and clean cartons. The use of any other type of packaging material is poor advertising and tends to lower the esteem consumers hold for the product.

Refrigeration

Nowadays, few consumers would consent to buy dairy products and meats anywhere except from a cooler or refrigerator. It is unfortunate that producers, consumers and egg merchants fail to realize the equally high perishability of eggs. If consumers would insist on buying eggs with the same exacting demands they apply to dairy products and meats, they could expect the same high quality of product.

Refrigeration, incidentally, is by far the most satisfactory method of preserving eggs. Excellent quality eggs can be had at reasonable prices the year around as a result of the surplus of the spring being kept in good refrigeration. It is well to keep in mind that refrigeration keeps an egg fresh and edible, which means that if good eggs go into refrigeration, good eggs can be taken out of refrigeration.

In some cold storage locker arrangements, it is possible to maintain a temperature suitable for holding eggs. The popularity of cold storage lockers and their easy accessibility suggest that it might be well to have these plants equipped with properly refrigerated rooms for holding eggs.

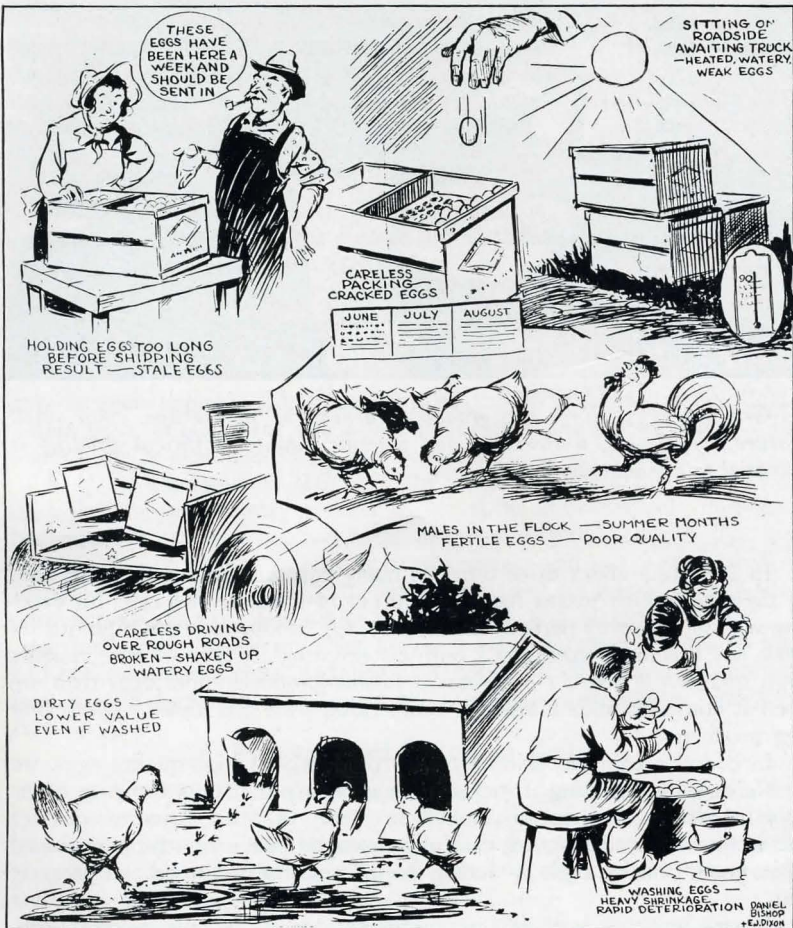
The Nutritional Value of Eggs

According to Dr. Ruth Leverton, nutrition specialist of the University of Nebraska:

"Eggs have earned their place in the sun along with other valuable and essential foods in the American diet. They have been scientifically tested for their value as a daily food and found to be tops.

"Eggs are an excellent source of protein for muscle building, phosphorus for bone, muscle, and blood building, iron for blood building, vitamin A for resisting infection and preventing night blindness, and vitamin D, the sunshine vitamin needed for strong bones and teeth.

"All this and more too—for an egg contains, in varying amounts, every essential for growth and development and the cost is small compared with many foods. When we know this, we need not ask, 'Why use eggs?' It



All these things affect egg prices—adversely. (Eggsaminer, 1929.)

is almost the same as asking 'Why try to get our money's worth?' The reasons are obvious.

"If everyone in the country would realize the food value of eggs and use approximately one a day, it has been estimated that the poultry people would have to produce 875 million dozen more annually than they do now."

MARKETING EGGS

In the marketing of eggs, the same services listed under the marketing of poultry may be applied and in the same order with the caution that eggs are much more fragile and perishable and therefore must be handled more carefully.



Grading eggs. Eggs are graded according to size, shape, color, shell texture, cleanliness, uniformity, and interior quality. Efficient grading is essential to efficient marketing.

In Nebraska about three times as many eggs are produced as are used in the state, which means that we ship out of the state two eggs for every one we use. In many parts of the country, egg production on a high-quality basis has become a specialized business resulting in eggs of exceptionally high quality. Whenever a Nebraska farmer produces more eggs than are used at home, he finds himself in competition with specialized high-quality egg producers.

In order to compete favorably with producers of high-quality eggs, we in Nebraska are finding it increasingly necessary that ours compare favorably in quality in order to compete favorably in price. Quality eggs are the result of a well planned, carefully managed production program based upon good, healthy, high-producing stock, comfortably housed and properly fed.

Proper breeding is highly important because it not only increases production but it directly influences egg size, shape, and color. Shell texture is influenced by feeding primarily, although breeding may also be a factor.

Clean eggs are not only more attractive but they are in greater demand at higher prices. Clean eggs are the result of good management (see previous remarks on poultry management and the production and handling of quality eggs).

Interior qualities such as yolk color and egg flavor are determined largely by feeding, although the environment in which eggs are kept may influence flavor.

Grading Eggs

Grading refers to systems used in classifying eggs according to quality (see quality factors mentioned above). Market grades established by the United States Department of Agriculture include four grades:

1. **U. S. Special.**—The *shell* must be clean, sound, and normal. The *air cell* must not exceed one-eighth inch in depth and must be regular. The *yolk* must be well centered, its outline indistinct, and it must be free from visible germ development and other defects or blemishes. The *white* must be firm and clear.

2. **U. S. Extra.**—The *shell* must be clean, sound, and normal. The *air cell* must be regular except in the retail grade of U. S. Extra, when the *air cell* may be slightly tremulous. The *yolk* must be fairly well centered and its outline may be moderately defined. It may be slightly mobile but must be free from visible germ development and practically free from other defects or blemishes. The *white* must be firm and clean.

3. **U. S. Standard.**—The *shell* must be clean and sound but may be slightly abnormal. The *air cell* must not exceed three-eighths inch in depth and may show movement not in excess of one-half inch. The *yolk* outline may be well defined. The *yolk* may be mobile and may show slightly visible germ development and other definite but not serious defects. The *white* must be reasonably firm and be clear.

4. **U. S. Trade.**—The *shell* must be clean and sound but may be abnormal. The *air cell* may be over three-eighths inch in depth, may show movement in excess of one-half inch, and may be bubbly or free. The *yolk* may be plainly visible. It may be freely mobile and cast a dark shadow. It may show clearly visible germ development but no blood. It may show other serious defects. The *white* may be weak and watery.

Other grade classifications are provided for three qualities of dirty eggs and one for cracked eggs. Detailed explanation of all grading terminology may be had by consulting the county extension agent or the College of Agriculture.

Packing and Shipping Eggs

Eggs for shipment are packed according to grade and color into new cases with new white fillers and cup flats. Eggs are put into fillers, small end down. Lids are nailed at ends only, with four nails at each end. Shipping labels are tacked to the ends of cases and never to the top or sides where there is danger of their being rubbed off.

From Lincoln the cost of marketing eggs in New York is about four and one-half cents per dozen. This total cost covers new cases, cupped flats, and white fillers, trucking to Omaha, assembling, and invoicing at Omaha, refrigerator freight charges to New York, and selling or commission costs. Variations from the above cost at other points in the state will be due to differences in the price of egg cases, flats, and fillers, and in transportation costs to Omaha.

During the past few years, such shipments have totaled several hundred cases weekly, and at peak seasons as much as a car load (400 cases) a day. Returns to long time, all year shippers, who produce and ship eggs of high quality, have averaged about five cents per dozen above what would have been received had the eggs been sold locally. For some individuals this has meant an added egg income of as much as 75 cents per hen. It pays to produce quality eggs in Nebraska and market them on a graded basis. (For details write the College of Agriculture.)

FEEDS AND FORMULAS

Since 60 to 70 per cent of the poultryman's total operating cost is feed expense, keeping well informed and adjusting feeding practices to prices of the ingredients without disturbing egg production is one of the duties of a good manager. In making changes, proposed formulas must be compared with original standard rations.

Mash Formulas (No. 8 and 8-S Used as All-Purpose Mash)

	No. 8	8-M with skim milk	No. 8-S	8-TSM, turkey starter	What will it cost?
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	
Yellow cornmeal	310	410	310	250	\$.....
Corn gluten meal (45% protein)...	...	...	...	...	\$.....
Shorts	200	200	200	200	\$.....
Bran	100	100	100	100	\$.....
Pulverized barley or whole oats....	100	100	100	100	\$.....
Alfalfa meal (No. 1 quality).....	100	100	100	100	\$.....
Meat scraps (55% protein).....	50	25	50	70	\$.....
Fish meal (65% protein).....	50	25	50	70	\$.....
Dried butter milk.....	50	..	..	35	\$.....
Soybean oil meal (43% protein)....	..	..	50	35	\$.....
Oyster shell or limestone (chick-size)	20	20	20	20	\$.....
Fine salt	10	10	10	10	\$.....
Suitable fish oil.....	10	10	10	10	\$.....
TOTAL	1,000	1,000	1,000	1,000	\$.....
Estimated protein content (%).....	18	15	19	22	

Nebraska No. 8 and 8-S are well known formulas that have been recommended by the Department of Poultry Husbandry for several years. They form the basis of many of the chick starting feeds mixed commercially in Nebraska and give splendid results when used for growing stock or laying hens.

Nebraska No. 8-M is recommended for chickens of all ages when skim milk is available. To use 8-M successfully for laying hens the daily ration for each 100 hens should be about three gallons of skim milk.

The all-purpose mash is not to be confused with the all-mash method of feeding. As a starting mash with baby chicks, no grain is fed for the first few weeks. After the second week, scratch grain is added and gradually increased until it is freely fed from open hoppers at the time the pullets go on range. This open-hopper plan of feeding grain and mash is continued until the pullets are put in laying houses in the fall. As layers, they are fed a limited amount of scratch grain and the same mash mixture is kept before them in open hoppers.

Nebraska No. 8-TSM is a mash recommended for starting turkeys. In numerous experiments it has proved very satisfactory.

Alfalfa meal must be high in protein (18 per cent +), low in fiber, and should carry a rich, green color. Carefully handled third and fourth cuttings often contain 20 per cent protein. Alfalfa meal can be made from

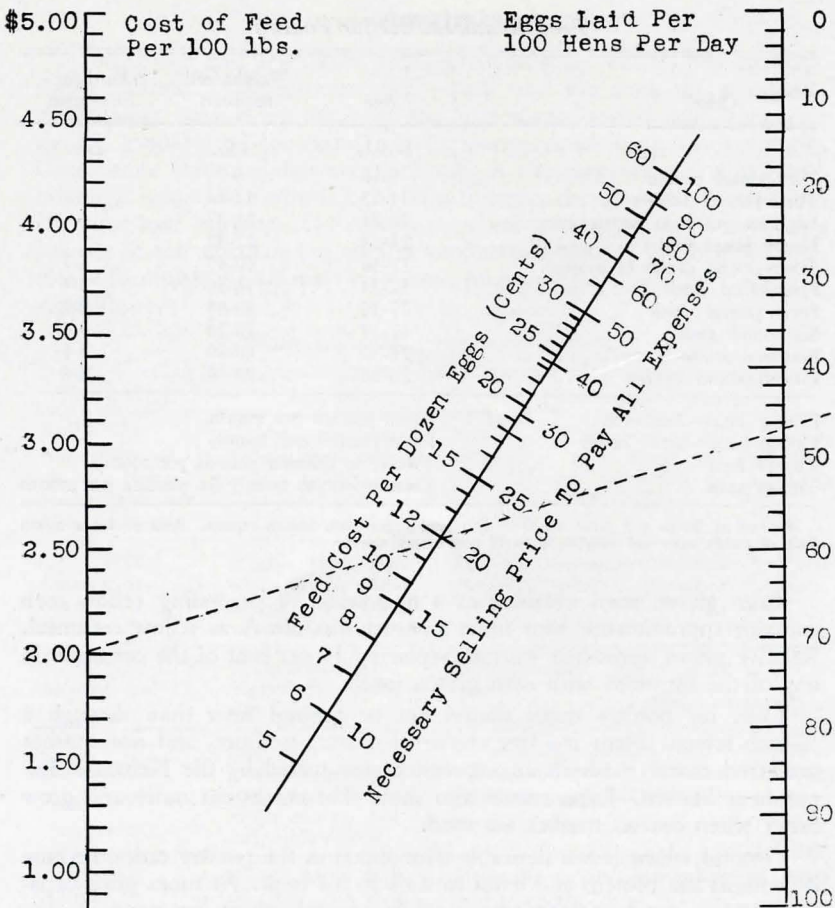


Chart for calculating feed cost of eggs. To find the cost per dozen, place a ruler across this chart. The dotted line is an example. With cost of feed at \$2.00 and production at 45 per hundred hens daily, the feed cost is 12 cents per dozen. (Courtesy Prof. L. E. Card, University of Illinois.)

carefully handled home-grown hay by grinding in a hammer mill equipped with a 5/32-inch screen. Dehydrated alfalfa meal (artificially cured) is excellent if leafy hay is selected for dehydration. Alfalfa meal should be stored in a cool, dark place to conserve the carotene.

Yellow corn is more satisfactory than white corn because of its vitamin A factor. White corn can be used safely when the mash contains at least 10 per cent of No. 1 quality alfalfa meal and one per cent fish oil.

Feed Requirements for Poultry

Class	Age	Weight feed required	Feed per lb. of gain
	<i>Weeks</i>	<i>Lbs.</i>	<i>Lbs.</i>
Two-pound broiler	8-10	6-7	3
Three-pound broiler.....	11-13	11-13	4
Leghorn pullet to laying age.....	20-24	23-27	..
Heavy breed pullet.....	24-28	27-32	..
Seven-pound capon or roaster.....	27-30	40-45	6-7
Five-pound duck.....	12-14	16-20	3-4
Seven-pound duck.....	27-30	40-45	6-7
Six-pound goose.....	12-14	18-20	3-4
Fourteen-pound goose.....	28-30	80-90	7-8
Fifteen-pound turkey (average).....	26-28	75-90	5-6
Laying hens—Leghorns.....	Seven pounds per month		
Laying hens—heavy breed.....	Eight pounds per month		
Turkey hens.....	Twelve to thirteen pounds per month		
Turkey toms.....	Twenty-four to twenty-six pounds per month		

Figures on ducks and geese are from Maryland Experiment Station reports. Average for a mixed flock of turkey toms and hens is 15 to 16 pounds per month.

Corn gluten meal obtained as a by-product of processing yellow corn contains approximately four times as much vitamin A as yellow cornmeal. Relative prices sometimes warrant replacing 10 per cent of the cornmeal in any of the formulas with corn gluten meal.

Corn for poultry mash should not be ground finer than through a $\frac{1}{8}$ -inch screen. Hens fed free choice of coarse, medium, and fine mashes preferred coarse mash in an experiment conducted by the Nebraska Experiment Station. Experiments also show that chicks eat more and grow faster when coarser mashes are used.

Ground wheat is less desirable than shorts in the poultry ration because it contains less protein and tends to stick to the beak. At times price variations may warrant substituting coarsely ground wheat for shorts in the mash.

No substitution is recommended for the 10 per cent of bran. Regrinding grain is a wasteful practice.

Pulverized oats or barley have been interchanged in Nebraska poultry rations. Indications are that it is not necessary to grind oats used in the laying mash. Oats in chick mashes should be pulverized.

Increased growth and improved egg production occur when a mixture of meat scraps, fish meal, and one other protein concentrate is used in the ration instead of meat meal alone as the source of animal protein.

Poultry will eat whole corn, wheat, oats, barley, kafir, and hog millet readily. They are equipped to grind these grains efficiently. Market values and availability should determine which of these grains are to be used as scratch feed. Good poultrymen favor using a mixture of these grains whenever possible.

Concentrates

During the past few years, feeding concentrates has gained considerable popularity. Concentrates justify study and use from the standpoint of economy because so many of the ingredients mixed with them are already available on the farm in many instances in forms ready for use. Concentrate formulas, however, are still in the experimental stage, with mixtures being determined in a large measure by prevailing conditions affecting feed supplies. On this account concentrate formulas are being left out of this circular, but poultry producers interested in their use may secure formulas, which may vary from time to time, from the College of Agriculture.

Vitamin Distribution and Functions

Terminology	Distribution	Physiological Function
A Antiophthalmic vitamin; precursors carotene & cryptoxanthin	Alfalfa, green grass, yellow corn, fish oils	Preserves normal condition of mucous membranes, nerve tissue, intestinal tract, etc.; prevents congestion of urates in kidneys and xerophthalmia
B (B ₁) Antineuritic vitamin; thiamin	Alfalfa, green grass, whole grains, wheat milling by-products, milk by-products, yeast	Prevents polyneuritis; stimulates feed consumption; preserves normal nerve tissue
C Ascorbic acid	Fresh fruits and vegetables, especially citrus fruits	Prevents scurvy. Not required in poultry rations
D Antirachitic	Egg yolk, fish oils, produced in body by irradiation with ultra-violet energy, 313 to 265 millimicrons	Essential for calcium and phosphorus utilization; prevent rickets, increases egg production and hatchability
E Antisterility	Alfalfa, green grass, oil from grain germs, grains, wheat milling by-products	Maintains normal functioning of reproductive organs
G Riboflavin; growth vitamin	Alfalfa, green grass, yeast, milk by-products, liver meal, fish meal, meat scraps	Growth promotive; prevents nutritional paralysis; essential for hatchability
K Antihemorrhagic factor	Alfalfa, green grass, fish meal, liver meal, meat scraps	Preserves clotting quality of blood
Antidermatosis factor; pantothenic acid	Alfalfa, green grass, milk by-products, liver meal	Maintains normal skin condition; prevents scabby lesions on eye lids and abnormal skin tissue on feet
Antigizzard erosion factor	Alfalfa, green grass, wheat milling by-products	Prevents eroded areas in the gizzard lining

Cooperative Feed Procurement

Throughout Nebraska more and more farm poultry raisers are using, with increasing benefits to themselves and to the poultry industry, the feed service of local mills and elevators in feeding the farm flocks. These mills and elevators grind and mix locally grown grains with milling by-products and concentrates according to tested formulas and sell them back to farmers at the cost of ingredients plus the cost of grinding, mixing, and sacking. This type of service is enabling Nebraska farmers to compete with producers in other sections of the country.

Another example of cooperation in securing feeds at encouraging prices has been observed in the cooperative feed pools. These are conducted on a pooled-order plan which permits the members of the group to secure feeds at lower prices but in smaller quantities.

POULTRY RECORDS

Whoever said "A business without records is like a clock without hands," must have had in mind the poultry business. The many details which make up successful poultry keeping practically make some form of record keeping a necessity, and record keeping in turn keeps the business on a sound basis because records render these services:

1. Reflect the economic conditions and possibilities of poultry.
2. Prove the advantages of improved management.
3. Develop business leaders.
4. Provide poultry raisers with helpful and timely information.
5. Help establish a favorable credit rating.

The Nebraska Agricultural Extension Service provides forms for keeping poultry cost account records.

Cost Account Yearly Summaries, Comparing Efficiency Factors

During the past ten years comparable methods of summarizing the Nebraska cost account records have been used. Efficiency factors may be compared in the following table. During this decade the variations in the sale price of a dozen eggs and the cost of 100 pounds of feed seem to have been largely responsible for the variations in labor income per hen.

Year	Eggs per hen for year	Eggs per hen started	Per cent dying	Per cent cull-ed	Per cent income from eggs	Sale price per dozen eggs	Feed cost per cwt.	Total income per hen	Total expense per hen	Labor income per hen	Feed cost per hen	Returns per \$1.00 worth feed
1931	135	99	12	55	71	\$0.19	\$1.50	\$3.03	\$2.26	\$0.77	\$1.32	\$2.29
1932	140	94	11	56	58	0.14	0.72	2.63	2.15	0.48	0.99	2.66
1933	135	93	17	42	66	0.14	0.76	2.33	1.65	0.68	0.90	2.57
1934	129	86	15	51	68	0.17	1.02	3.00	2.24	0.76	1.35	2.32
1935	145	87	13	58	71	0.30	1.72	4.40	3.00	1.40	2.04	2.32
1936	139	101	16	43	69	0.24	1.60	3.87	2.83	1.04	2.00	1.93
1937	143	97	16	48	77	0.23	2.24	3.54	3.08	0.46	2.17	1.63
1938	153	117	20	48	68	0.20	1.38	3.69	2.36	1.33	1.46	2.53
1939	170	131	16	42	75	0.18	1.21	3.41	2.18	1.23	1.49	2.29
1940	157	116	16	50	73	0.18	1.40	3.15	2.49	0.66	1.72	1.83
Av.	145	102	15	49	70	\$0.20	\$1.35	\$3.30	\$2.42	\$0.88	\$1.54	\$2.23