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SELECTING BREEDING STOCK FOR BROILER PRODUCTION

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COVER ILLUSTRATION SHOWS CONTRAST IN WING-FEATHER DEVELOPMENT IN CHICKS AT AGE OF 10 DAYS. TOP—
WELL-DEVELOPED PRIMARY AND SECONDARY FEATHERS; BOTTOM—FAIR GROWTH OF PRIMARY FEATHERS AND
POORLY DEVELOPED SECONDARIES. (N3882.)

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SELECTING BREEDING STOCK FOR BROILER PRODUCTION

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The wartime demand on our meat supplies may be met to an important extent by increasing the production of poultry meat. Poultrymen who are equipped to produce broilers can aid in this emergency.

The demand for meat chickens and the development, in some localities, of poultry farms devoted primarily to the raising of broilers have created interest in selecting breeding stock having superior meat characteristics. The presence of numerous farms engaged in broiler production in such localities has given rise to the term "broiler areas" in which this specialized phase of poultry raising is well advanced. To aid poultrymen in producing superior broilers the United States Department of Agriculture has conducted investigations at the Department's Beltsville Research Center, Beltsville, Md., the results of which are presented in this leaflet. The studies have demonstrated that by observing certain characteristics in day-old chicks and growing stock a poultryman can select breeding stock that will improve his flock in regard to broiler and fryer production. This can be done in practically all breeds and varieties with little or no loss in egg-production characteristics and at practically no additional cost.

The plan consists in the selection of chicks for fast feathering, as shown by the number and size of the wing and tail feathers, and a later selection of the growing chicks for efficient and rapid growth and for superior meat production. Selection on this basis results in a material improvement in the quality of broilers or fryers produced by such a flock of breeders. The selection is applied to both males and females and is maintained throughout the life of the breeding stock.

Fast Feathering

Fast-feathering stock is desirable for meat production because the chicks from such stock have a minimum of pinfeathers at broiler or fryer age. When chickens are killed and dressed, if there are too many pinfeathers the carcass appears untidy and poorly dressed. Such birds usually bring from 2 to 4 cents a pound less than birds properly dressed.

FIGURE 1.—Wing of chick showing seven primary and seven secondary feather sheaths, all of which are nearly equal in length.

FIGURE 2.—Wing of another chick with similar development of feather sheaths. Both this figure and figure 1 show good types of fast feathering.

FIGURE 3.—Wing of chick showing good wing-feather development but with fewer and shorter secondaries than those shown in figures 1 and 2.

FIGURE 4.—Another example of good wing-feather development. Both this figure and figure 3 show fairly good types of fast feathering.

FIGURE 5.—Wing of chick of the slow-feathering type. Note fewer number of both primary and secondary sheaths.

FIGURE 6.—Wing of another chick of the slow-feathering type. Note the short primaries with no secondaries showing through the down.

Selection to obtain breeders that feather rapidly is most easily accomplished at the time of hatching. Fast feathering is a sex-linked recessive to slow feathering; hence, when mated together male and female breeding birds selected for fast feathering will produce fast-feathering chicks.

Rate of feathering can be determined in day-old chicks by the length of the primary and secondary feather sheaths of the wing and the number of the secondary feather sheaths. The chick with highest rate has well-developed primaries and secondaries, with six or more secondaries. The next best has six or more secondaries which are not so well developed but are approximately as long as the primaries. The chick of the slow-feathering type has no secondaries, or less than six short ones, and no primaries, or very short ones.

Figures 1 to 6 show different types of feathering in day-old chicks. Figures 1 and 2 show the best types of fast feathering. After a little experience a poultryman can select chicks of this type so that approximately 100 percent of the selected birds will have relatively large primary and secondary wing- and tail-feather development at 10 days of age (cover illustration and fig. 7) and they will be fully feathered with a minimum of pinfeathers at 12 weeks of age. They are the best for breeders.

The second group (figs. 3 and 4) are good types of fast-feathering chicks but, unlike the best fast-feathering chicks, some of them will be considered slow feathering at 10 days of age, and at 12 weeks of age such chicks will have pinfeathers on the back and a few on other parts of the body. The tail development at 10 days usually will be shorter than it is in the best-feathered birds. About 90 percent of the chicks in this group will be fast feathering at 10 days of age and well-feathered at 12 weeks of age. These chicks will make good breeders in respect to fast feathering.

The third group (figs. 5 and 6) illustrates slow-feathering chicks. About 90 percent of such chicks feather slowly, have no tail-feather development at 10 days and small primary and secondary wing-feather development (fig. 7, left). Some of them will develop into "bare backs" at 12 weeks of age and many of them will have a considerable number of pinfeathers. These are not good breeders with respect to feathering. In this group the males, in particular, should not be used as breeders.

When selection is made of fast-feathering chicks (fig. 7, right), they should be raised by themselves, or if this is not feasible, they should be identified by some means. Wing banding is considered as the best and most permanent means of identification. If this is not practicable, then the chicks may be toe-punched, or a pair of scissors may be used to cut the web between the toes. In any case, some means should be adopted that will make it possible to recognize such chicks at a later age.

Efficient, Rapid Growth

Efficient, rapid growth is best measured by the weight of the bird at an early age. Statistical studies¹ on the growth of cockerels

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FIGURE 7.—Chicks showing contrasting feather growth. Left, slow-feathering chick at age of 10 days; right, fast-feathering chick at same age.

have indicated that the greatest variability occurs between 3 and 6 weeks of age, if a good diet is fed and the cockerels have access to direct sunlight and free range. Therefore, this is the best period in which to make accurate selection of the most efficient birds by their body weights. At this age there are maximum differences in weight between the slowest growing, the average, and the fastest growing individuals. This difference becomes less and less after the fourth week, until at maturity there is approximately no difference. Thus, the older the birds after 4 weeks of age, the less accurately can selection be made on the basis of efficiency of growth.

Some of the best birds selected at this time, however, do not develop up to expectations; others appear to stop growing at an early

¹ HAMMOND, J. C., and BIRD, H. R. EFFECTS OF NUTRITION ON VARIABILITY IN THE GROWTH OF CHICKENS. *Poultry Sci.* 21: 230-242, illus. 1942.

age. Therefore, some further selection should be made of these birds at approximately 20 weeks of age and just before they are placed in the breeding pens.

Superior Breast Development

Broilers generally have only fair breast development. As the breast meat is the most valued part of the broiler, it is important that this characteristic should be given considerable attention in any selection and breeding program. Observations of the breast development should be made when birds are from 6 to 12 weeks of age. For these observations each bird should be examined individually and held in a similar position. A good way to make this observation is to hold the chicken by the legs in the left hand, with its head downward, and with the right hand to examine the width and length of the breast. By comparisons, the birds can be divided among at least four grades as shown in figure 8.

FIGURE 8.—Breast types and grades of birds to be selected as breeding stock for broiler production. Observations made about three-quarters of an inch from the edge of the keel. A and B show desirable fullness of breast; C and D are poorer types.

At this time observations may be made also on any imperfections of the breastbone or skin, such as curved and dented breastbones and breast blisters. Any individual with such imperfections should not be used as a breeder. With a little experience one soon learns to judge the relative breast development in birds of the same age accurately.

The different breast grades represent measurements used in poultry-meat production experiments at the Beltsville Research Center. This method of classification permits four grades, A, B, C, and D, and if one wishes further division of these grades they can be graded into A+, A, A-, B+, B, B- breast types and so on. Only males with A or B breasts and females with A, B, or C breasts should be kept for breeders.

As previously stated, one of the best times to select breeding birds for efficient, rapid growth is at 6 weeks of age. This is also an ideal age to observe breast development and both these observations may be made at this time. This eliminates one handling of the birds.

Summary of Characters Indicating Suitability of Birds for Breeding Stock in Broiler Production

MALES

Desirable

Indications of fast feathering as day-old chicks and at 10 days and 8 to 12 weeks of age.
Rapid growth at 4 to 6 weeks, 20 weeks, and before birds are placed in breeding pens.
A and B grades of breast development at 6 to 12 weeks of age.
No defects.

Undesirable

Indications of slow feathering as day-old chicks and at 10 days and 8 to 12 weeks of age.
Medium or slow growth at 4 to 6 weeks, 20 weeks, and before birds are placed in breeding pens.
C and D grades of breast development at 6 to 12 weeks of age.
Any defects.

FEMALES

Desirable

Indications of fast feathering as day-old chicks and at 10 days and 8 to 12 weeks of age.
Rapid and medium growth at 4 to 6 weeks, 20 weeks, and before birds are placed in breeding pens.
A, B, and C grades of breast development at 6 to 12 weeks of age.
No defects or slight defects.

Undesirable

Indications of slow feathering as day-old chicks and at 10 days and 8 to 12 weeks of age.
Slow growth at 4 to 6 weeks, 20 weeks, and before the birds are placed in breeding pens.
D grade of breast development at 6 to 12 weeks of age.
Serious defects.