CHAPTER 2

Selecting for Egg Production

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This outline for selecting desirable production traits in chickens was developed as part of an American Livestock Breeds Conservancy pilot project to recover breed production characteristics of endangered poultry. These guidelines are from well-established parameters developed by "old school" poultrymen, as documented in some of the early to mid-20th century poultry texts. This once commonplace knowledge and practice has become unknown to most modern chicken farmers due to the ready availability of chicks that can be purchased from large hatcheries.

The following information can be used by the producer to identify birds that will excel in egg-laying production traits and would be good candidates to retain as layers or for breeding stock. Keep in mind that any bird that is selected for breeding must also meet the established historic standards for the breed. These historic standards were written at a time when chicken breeds were being used for commercial production within several production systems. Input from the top breeders of each breed was used to establish the particulars of size and other qualities that would produce the best specimen for the role each breed was designed to fulfill.

When comparing birds within a flock, compare birds of the same breed, sex, and relative age (e.g., mature hens should not be compared to pullets) in order to get an accurate assessment of their production qualities. It's a matter of comparing "apples to apples." It is best to evaluate multiple birds when making culling or breeding decisions for the flock. The first bird to be assessed will serve as the "example bird" to compare with the second bird. If the second bird has better qualities than the first, then the second bird then becomes the example for comparison – and so forth for the rest of the flock evaluation. There is also value in using a poor representative of the breed for comparison in order to fairly assess poor production qualities and to better recognize mid-level or superior qualities. Place into crates poor quality birds that are potential "culls" as the entire flock is being assessed. These "culls" can then be marked, removed from the flock, processed, or placed in a separate area to await sale as stewing fowl.

Identifying a Hen that Is Laying Eggs

The first and most basic knowledge a poultry producer should have, is to know how to identify which hens are in production.

Once a female chicken has reached physical maturity egg production begins. The biological process of laying eggs begins with sunlight. Sunlight stimulates the pituitary gland causing a release of hormones, which effect changes in the chicken's body. These hormones cause the soft tissues to expand: comb and wattles increase in size and soften; skin becomes velvety and stretchable; the egg organs increase in size; the abdomen becomes enlarged, soft, and pliable; the distance between the pelvic arch and the rear tip of the keel bone increases dramatically; the distance between the pelvic bones increases; and the vent becomes moist and wide.

A hen that is not in laying condition will be found to have: short, hard, shriveled comb and wattles; small, puckered, and dry vent; short distance between the pelvic arch and the rear tip of the keel bone; little distance between the pelvic bones; skin will be tight and somewhat coarse in texture; and abdomen will be found to be firm, and in some cases hard.

Characteristics of a Hen In Production

1. Soft, enlarged comb and wattles
2. Wide, moist vent.
3. Increased distance between the pelvic bones
4. Increased distance between pelvic arch and keel
5. Velvety skin
6. Soft, pliable, enlarged abdomen

Characteristics of a Hen Out of Production

1. Short, hard, shriveled comb and wattles
2. Small, puckered, and dry vent
3. Little distance between the pelvic bones
4. Short distance between pelvic arch and keel
5. Tight, coarse skin
6. Firm abdomen



Large moist vent of a hen in production



This hen has a small, dry puckered vent and is not currently laying eggs.

Identifying superior egg layers

1. Pelvic bone arch and the keel to pelvic bone spread – Each value is measured during peak production periods in mature laying hens. These measurements are comparative assessments between birds within a breed. They are used as identifiers for birds with superior egg laying ability. Good breadth of spread means the birds have ample space for reproductive organs and for eggs. Pubic bones should be of medium thickness and be flexible rather than stiff. Extremely stiff or thick pelvic bones indicate that the hen is not laying. Extreme thinness and flexibility are also undesirable as they are indicators of underlying illness or problems with the bird.

a. Pelvic arch – the two bones that form the pelvic arch are located just below the vent of the chicken. As a hen lays, the vent moves down below these bones and the egg is ejected. The distance between the two bones in a hen in production is a good indicator of relative egg size. Ideally, the bones themselves will be relatively thin – having little fat and gristle coating them – perhaps only 1/4 inch thick or less when pinched between the thumb and forefinger. Distance is measured by the number of fingers that fit within the pelvic arch – each finger is considered approximately 3/4 of an inch thick. On most Standard large fowl breeds, better hens will have room to fit three or more fingers between the pelvic bones.



This hen has superior width between her pelvic bones – measuring four fingers across.



Only one finger between the pelvic bones of this pullet. A hen in production with so small a span would lay a small egg. However this pullet has yet to start to lay.



This hen has superior spread between her pelvic bones and keel bone, indicating that she will lay a large number of eggs. She measures six fingers span; notice that the pinky finger is extended to allow measuring this distance with one hand.



A pullet showing a spread of only two and half fingers between her pelvic and keel bones. She has yet to begin to lay eggs, but had she been in production and had so small a spread she would be a poor egg layer indeed.

b. Keel/Pelvic Spread – The distance between the pelvic arch and the rear tip of the keel bone is a good indicator of the size of the egg organs and the number of eggs produced (relative to breed). Most Standard breeds will fit four or more fingers between the pelvic arch and the keel bone. Large breeds, such as the Buff Orpington, naturally should have greater space relative to number of eggs laid than smaller breeds, such as the Leghorn. It is not unusually for a high-producing Leghorn hen to measure a 6.5-finger span.

2. Molting Ability – Birds should be selected for their molting abilities. Individuals that drop feathers almost all at once are preferred over birds that take longer to molt. The quicker the molt, the quicker the birds get back to the business of laying eggs. It is preferable that the molt occur later in season for optimal persistency of lay (such birds lay eggs for a longer period of time during the year). A mid- to late September molt is ideal. August is acceptable, but barely. July is completely unacceptable. Caution: a late-molting hen will be out of production for six to eight weeks; do not cull the hen flock for lack of production during September through November or risk culling your best layers. To retain your best layers, band the birds which:

- Wait to molt until September or October.
- Drop nearly all of their feathers at once.
- Grow nearly all their wing feathers back at once.



This pullet has dropped a few feathers at a time – a sign of slow molting.



This hen is growing all of her feathers in at the same time – a sign of fast molting.

3. Abdomen – A soft pliable abdomen is a good sign of a healthy hen. Sometimes a hen will be found that has very good spread between the keel bones and the pelvic arch but also has a hard abdomen. Such a hen very likely has a cancerous tumor, though occasionally an egg is mistaken for such a hard lump.

4. Body Capacity – The space within the body of a chicken is filled with various organs. When one section of the body is narrow or lacks space, the organs of that area must be reduced for space and thus tend to function below optimum.

- Birds with good width between their legs often are better layers, as this is one indicator of body capacity.
- Birds with full, well-rounded breasts and with legs set well back tend to be more productive. This is another trait that indicates body capacity.
- The body of high capacity egg layers is not quite rectangular , when viewed from the side – it is deeper at the rear than in the front of the bird. This allows more room for egg organs.

5. Some Other Egg-Laying Points – Here are some additional points that may be useful in selection.

- Birds that begin to lay early in the year, while the days are short, tend to be better egg layers. Productive hens begin laying by late February or early March – any hen not in lay by early April may be culled.
- Pullets that come into production between 180 and 215 days of age tend to develop into excellent layers.
- Pullets that begin to lay early tend to lay smaller eggs.
- First-year hens that lay 25 or more eggs during August and March in the year following hatching tend to be better producers.
- Egg size and body size are correlated.
- February is the month that maximum first-year egg size is obtained, nearly regardless of hatch date.
- Second-year egg production is usually reduced from first year by 20%.
- High-producing hens tend to have brittle or broken feathers. This is caused by putting so much of their resources into producing eggs.

Considerations that Can Affect Egg Production

The actual number of eggs laid by a hen are influenced by a number of factors including genetic potential and management. The intelligent poultryman will manage fowls to provide optimum conditions for egg production.

- Light stimulates the pituitary gland, thus leading to egg production. For optimum egg production 14 hours of daylight is required. Using a light bulb in the hen house to add 2-4 hours per day will bring hens into lay in about three weeks.
- Water is required for the production of eggs. Chickens with frozen water may stop laying due to lack of consumable water during winter.
- Chickens will drink more clean water than dirty water.



Notice how nearly all the wing feathers have grown out at the same time and are the same length – this is the wing of a fast molting hen.



Notice the feathers on this wing are many different lengths, some even missing completely – this is the sign of a hen that is slow in molting.

- Stress will reduce egg production. Moving chickens to new pens or adding new chickens (such as new roosters) can reduce or stop egg production for a few weeks.
- Fattening feeds, such as corn, scratch feeds, and oils, can reduce or stop egg production.
- Fat hens lay poorly. The fat coating around the pelvic bones gives a good indicator of the condition of your hens. Adding 1-2 tablespoons of apple cider vinegar per gallon of drinking water, along with feeding a good basic layer ration, can get hens back into production.
- Oats fed along with a good base layer ration tend to encourage egg production.
- Chickens that were fed low quality feed may never develop to their full potential. The first three weeks are the most critical to proper development.
- Inexpensive, low quality layer rations often lead to poor egg production. Feed a good, well-balanced layer ration.
- Hens need to feel secure in order to lay well. Provide well designed nest boxes in ample quantities to avoid crowding. (A good rule of thumb is four hens per nest.)
- Overcrowded chickens do not lay at their peak because of the stress they are undergoing.
- Chickens that are exposed to ammonia may become sick and often lay poorly during exposure. Keep your chicken house clean – if you smell ammonia then the chickens are already stressed.
- Sick chickens lay poorly. Maintain the health of your flock and address disease issues quickly.
- Internal and external parasites will reduce or prevent egg production. Check hens periodically to be sure they are in good condition and not troubled by parasites.
- Brittle and broken feathers on hens can be an indicator of a lack of calcium (as well as of high egg production). Provide oyster shell free choice, as high producing hens may require more calcium in their diet than is contained in their layer ration.
- Unless you have granite pebbles laying around, you can assume that your birds will benefit from supplemental grit. Grit helps grind the feed and contributes to better feed efficiency, and thus is well worth the cost and effort to provide.

Measuring Productivity

Many different measurements have been used over the years to record egg production. Number of eggs per year has had different meanings including: number of eggs laid from commencement of production until same date one year later; number of eggs laid from commencement of production until end of production (which may exceed one year); number of eggs laid from January through January; calculated number of eggs expected which may include measures of actual eggs laid for the first week of each month; etc. These measures invariably refer to the first period of egg production, that is, the period when the pullet is approximately 6 to 18 months of age. Second and later years of production have not historically been measured for advertising and comparison purposes.

Walter Hogan, in his book *The Call of the Hen* (circa 1914), laid the foundation of hands-on appraisal of poultry for productivity. One method he devised was the approximation of the expected number of eggs a hen would likely lay during her first year of production. Amazingly, Mr. Hogan was quite accurate in his estimations – gaining the attention of some of the colleges with poultry improvement programs. Though his system was quite complex, a simplified version of his techniques can be quite useful in appraising laying potential in a poultry flock.

During ALBC's work selecting and improving Buckeye chickens, which resulted in these three chapters you are reading, we found Mr. Hogan's technique quite accurate in appraising the laying qualities of the pullets. By focusing on healthy fowl in production around the beginning of March, the techniques revealed the better layers with great accuracy and the poor layers with good accuracy – the poorest hen actually laying fewer eggs than expected.

To use this to compare to your own breed, simply measure hens in production for distance in fingers between the pelvic and keel bones and then feel the thickness of one of the pelvic bones – thus coming to understand the amount of fat, gristle, and skin encompassing the bone. The expected number of eggs may need to be adjusted for breeds larger or smaller than the Buckeye as body capacity may differ. A basic table is on the next page.

How does this table function? Hens with proper hormone levels tend to have expanded egg organs and therefore, a greater distance between their pelvic and

Estimating Egg Production Using Chicken Body Measurements		
Keel/Pelvic Spread (measured by span of fingers)	Pelvic Bone Thickness (measured by span of fingers)	Approximate Annual Egg Production
6.0”	.5”	205 eggs
6.0”	.375”	235 eggs
6.0”	.25”	265 eggs
5.5”	.5”	175 eggs
5.5”	.375”	205 eggs
5.5”	.25”	235 eggs
5.0”	.5”	145 eggs
5.0”	.375”	175 eggs
5.0”	.25”	205 eggs
4.5”	.5”	130 eggs
4.5”	.375”	160 eggs
4.5”	.25”	175 eggs
4.0”	.5”	80 eggs
4.0”	.375”	110 eggs
4.0”	.25”	138 eggs

keel bones. Also, measuring the body condition of the hen reveals whether she is putting her energies into the production of meat and fat or into the production of eggs.

Resources and Suggested Reading

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