

Selecting Your Best Turkeys for Breeding

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Well marked and fleshed Royal Palm toms.

Selecting Your Best Turkeys for Breeding

Chapter 1 – The Definition and History of the Heritage Turkey

The American Livestock Breeds Conservancy's Definition of a Heritage Turkey:

All domesticated turkeys descend from wild turkeys indigenous to North and South America. They are the quintessential American poultry. For centuries people have raised turkeys for food and for the joy of having them.

Many different varieties have been developed to fit different purposes. Turkeys were selected for productivity and for specific color patterns to show off the bird's beauty. The American Poultry Association (APA) lists eight varieties of turkeys in its *Standard of Perfection*. Most were accepted into the *Standard* in the last half of the 19th century, with a few more recent additions. They are Black, Bronze, Narragansett, White Holland, Slate, Bourbon Red, Beltsville Small White, and Royal Palm. The American Livestock Breeds Conservancy also recognizes other naturally mating color varieties that have not been accepted into the APA Standard, such as the Jersey Buff, White Midget, and others. All of these varieties are Heritage Turkeys.

Heritage Turkeys are defined by the historic, range-based production system in which they are raised. Turkeys must meet all of the following criteria to qualify as a Heritage Turkey:

- 1. Naturally mating:** the Heritage Turkey must be reproduced and genetically maintained through natural mating, with expected fertility rates of 70-80%. This means that turkeys marketed as "Heritage" must be the result of naturally mating pairs of both grandparent and parent stock.
- 2. Long productive outdoor lifespan:** the Heritage Turkey must have a long productive lifespan. Breeding hens are commonly productive for 5-7 years and breeding toms for 3-5 years. The Heritage Turkey must also have a genetic ability to withstand the environmental rigors of outdoor production systems.
- 3. Slow growth rate:** the Heritage Turkey must have a slow to moderate rate of growth. Today's Heritage Turkeys reach a marketable weight in about 28 weeks, giving the birds time to develop a strong skeletal structure and healthy organs prior to building muscle mass. This growth rate is identical to that of the commercial varieties of the first half of the 20th century.

Beginning in the mid-1920s and extending into the 1950s turkeys were selected for larger size and greater breast width, which resulted in the development of the Broad Breasted Bronze. In the 1950s, poultry processors began to seek broad breasted turkeys with less visible pinfeathers, as the dark pinfeathers, which remained in the dressed bird, were considered unattractive. By the 1960s, the Large or Broad Breasted White had been developed, and soon surpassed the Broad Breasted Bronze in the marketplace.

Today's commercial turkey is selected to efficiently produce meat at the lowest possible cost. It is an excellent converter of feed to breast meat, but the result of this improvement is a loss of the bird's ability to successfully mate and produce fertile eggs without intervention. Both the Broad Breasted White and the Broad Breasted Bronze turkey require artificial insemination to produce fertile eggs.

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Interestingly, the turkey known as the Broad Breasted Bronze in the early 1930s through the late 1950s is nearly identical to today's Heritage Bronze turkey – both being naturally mating, productive, long-lived, and requiring 26-28 weeks to reach market weight. This early Broad Breasted Bronze is very different from the modern turkey of the same name. The Broad Breasted turkey of today has traits that fit modern, genetically controlled, intensively managed, efficiency-driven farming. While superb at their job, modern Broad Breasted Bronze and Broad Breasted White turkeys are not Heritage Turkeys. Only naturally mating turkeys meeting all of the above criteria are Heritage Turkeys.

Definition prepared and endorsed by Frank Reese, owner & breeder, Good Shepherd Farm; Marjorie Bender, Research & Technical Program Manager, American Livestock Breeds Conservancy; Dr. Scott Beyer, Department Chair, Poultry Science, Kansas State University; Dr. Cal Larson, Professor Emeritus, Poultry Science, Virginia Tech; Jeff May, Regional Manager & Feed Specialist, Dawes Laboratories; Danny Williamson, farmer and turkey breeder, Windmill Farm; Paula Johnson, turkey breeder, and Steve Pope, Promotion & Chef, Good Shepherd Farm.

A Brief Timeline of the Domesticated Turkey

<i>2000 years ago</i>	Domestication of the turkey by Aztecs in Mexico and Mayans in Central America
<i>Early 1500</i>	Cortez and Spanish explorers find both wild and domesticated turkeys
<i>1500 - 1519</i>	Turkey first taken back to Spain
<i>1500s</i>	Several European varieties were developed including: <ul style="list-style-type: none">• Norfolk Black• Cambridgeshire Bronze• White Austrian• Buff• Blue• Ronquieres (a small variegated Belgian variety)
<i>By 1600</i>	Turkeys were found throughout Europe. Turkey was widely used in celebrations and holiday feasts and was well regarded for its sumptuous meat.
<i>Early 1600</i>	European varieties of turkeys return to North America with colonists.
<i>1621</i>	First Thanksgiving is celebrated at Plymouth Colony. According to folklore wild turkey was served as a main course.
<i>By 1700</i>	Domesticated turkeys were plentiful in the mid-Atlantic region and through the Coastal South.
<i>October 3, 1789</i>	George Washington declared a day of Thanksgiving.



A historic holiday postcard

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October 3, 1863 Abraham Lincoln officially proclaimed Thanksgiving as a national holiday. (This has been traditionally celebrated on the last Thursday of November.)

1874 The American Poultry Association (APA) was formed. They established and adopted Standards for five varieties of turkeys:

- Bronze
- Narragansett
- White Holland
- Black
- Slate

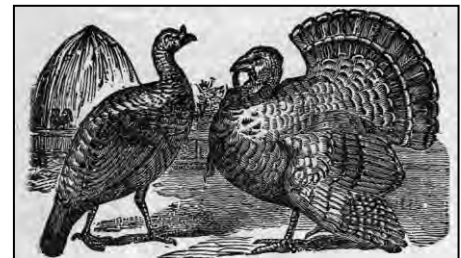
1909 Bourbon Red was accepted into the *APA Standard of Perfection*

1951 Beltsville Small White was accepted into the *APA Standard of Perfection*

1971 Royal Palm was accepted into the *APA Standard of Perfection*

The Great Change from Standard to Broad Breasted Turkeys

1900s Breeders in Washington and Oregon produced larger birds with broader breasts. These were called Mammoth Bronze.



Turkey etching circa 1930

1927 Jesse Throssel an immigrant to British Columbia, Canada, from England, imported two lines of turkeys (a Bronze and a White), that had been selected for greater breast width. These were known as the Cambridgeshire lines.

Late 1930s Cambridgeshire Bronzes had been crossed into the Mammoth Bronze population, including the renowned Wagon Wheel Ranch strain.

1938 Mrs. H. P. Griffin coined the term “Broad Breasted Bronze.” This was a commercial term that meant double-breasted in which mounds of muscle were on both sides of the keel bone.

1950s Fertility troubles began to occur. Broad-breasted conformation brings with it a shorter keel bone and shorter shanks in addition to the bulkier muscle mass on the breast. This conformation prevents males from effectively mounting females, resulting in lower fertility rates. Industry began to perfect artificial insemination techniques to compensate.

1950s Large, white feathered varieties were developed. These dressed-out more cleanly. Breeders competed at shows based on side-by-side comparisons of productivity. Breeders include: Amerine, Browning, Gozzi, Jerome,

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Jones, Keithly, Kimber, Lovelace, Lyons, Nicholas, Rose-a-Linda, and Wrolstad.

- 1960s* These large white turkeys began appearing in the market. At this time, most consumers purchased dressed birds based on carcass appearance. The white varieties were preferred because they lacked the dark pin feathers and melanin that remained in the carcass of colored feathered birds.
- 1960s* Artificial insemination became common practice among commercial breeders.
- 1997* The American Livestock Breeds Conservancy (ALBC) conducted a census of *Standard* varieties of turkeys maintained by hatcheries. The total number of breeding birds of all *Standard* varieties was 1,335. ALBC began actively promoting Heritage Turkeys.
- 2003* ALBC conducted a second census, including a survey of individual breeders. The total breeding birds of all *Standard* and non-standard varieties was 4,412.
- 2004 – 2006* ALBC and Virginia Tech conducted research that demonstrated that Heritage Turkeys have more robust immune systems than industrial strains.
- 2006* ALBC conducted third census. The total breeding birds of all *Standard* and non-standard varieties was 10,404.

Today's International Turkey Industry

Today, only two international companies own most commercial turkey genetics, Aviagen, based in the United Kingdom, and Hybrid, based in Canada. Aviagen now owns the genetic resources of two previously significant commercial companies, Nicholas, from California, and British United Turkeys (BUT) from the United Kingdom. BUT had an American operation, including a breeding farm based in West Virginia. Both Nicholas and BUT offered multiple strains. When Nicholas bought BUT of America in 2004, the American breeding stock was destroyed. Aviagen subsequently purchased Nicholas. As of February 2009, the Aviagen website only offered two strains from each company for sale. This story is of great importance because it shows just how quickly genetic resources can be lost.

Important Names in the History of Domestic Turkeys

Poultry Judges

Below is a listing of great American Poultry Association (APA) Judges of the twentieth century who significantly influenced turkey breeding in the United States during their time. These names will appear in historical documents and the informed reader will find them worth recognizing.



George Hackett

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George W. Hackett (early 20th century)

- The first to certify breeding flocks.
- Defended standard turkeys against change to the double-breasted conformation.
- Actively opposed the industrialization of turkey production.

M.C. (Maggie) Small

- Editor of *Turkey World* for Watt Publishing (beginning in 1934)
- Executive Secretary-Treasurer for the National Turkey Federation (1939-1970)
- Consultant to the Foreign Agricultural Service, USDA (beginning 1969)

Stanley J. Marsden (1897-1971)

- Poultry Instructor – University of Nebraska 1921-1929
- USDA Turkey Investigations 1929-1965
- With J. Holmes Martin, authored *Turkey Management* (6 editions, last printing in 1955)
- Led the team that developed the Beltsville Small White turkey



Stanley Marsden



Norm Kardosh

Influential Breeders

Great breeders produce quality birds that are highly desirable. These breeders leave their mark when their strains are valued and maintained by future breeders. Some of these strains continue but others are now extinct. Protecting strains from extinction is not about nostalgia. Rather, protecting the strains ensures the greatest genetic diversity within the population, and therefore the greatest health of the breed. The strains (or bloodlines) are the bedrock on which long-term survival of standard turkeys depends. Knowing, understanding, valuing, and protecting the strains in your flock will help assure their survival and that of standard turkeys.



Mrs. Ole Nelson

Below is a list of some of the great turkey breeders. The strain's name is synonymous with the breeder's name. The names in parentheses are breeders and/or strains in which the original strains still exists today.

Bronze

- Bird Brothers, Shelton, PA. Famous for the Goldbanks Bronze, (Norm Kardosh – deceased, Frank Reese)
- Turkey Ranch Bronze (extinct)
- Mrs. Martha B. Walker Bronze (Rolla Henry – deceased, Frank Reese)
- Wagon Wheel Ranch H. P. (extinct)
- Griffin B B Bronze (extinct)
- Reiman Turkey Farms Bronze (extinct)
- Elvin Risbrudt Bronze (introduced into Norm Kardosh flock in 1960s), (Norm Kardosh – deceased, Frank Reese)
- Rolla Henry Bronze (Norm Karosh – deceased, Frank Reese)



Sadie Caldwell

Narragansett

- Ole Nelson Narragansett (Norm Kardosh - deceased)
- Hawkeye Farms Narragansett (extinct)

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- Oakdale Turkey Farm Narragansett (Norm Kardosh - deceased)
- Norman Kardosh Narragansett (Frank Reese)

Bourbon Red

- J. F. Barbee Bourbon Red, (extinct)
- Mrs. Sadie B. Caldwell Bourbon Red (Norm Kardosh – deceased, Frank Reese)
- Gladys Honssinger Bourbon Red (Norm Kardosh – deceased)



Mrs. W.T. Hall

Black

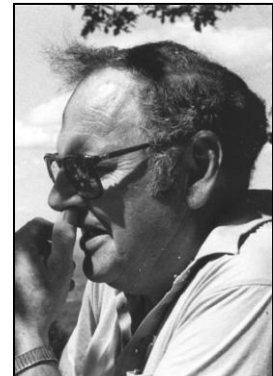
- Mr. Ole Nelson Blacks (Danny Williamson)
- Mrs. W.T. Hall Blacks (extinct)
- Wm. N. DeWald Blacks (extinct)



Henry Domes

White Holland

- Henry W. Domes White Holland (extinct)
- Jeffrey's Turkey Farm White Holland (extinct)
- Mrs. Homer Price White Holland (extinct)
- Frank R. Reese White Holland. Made in 2002 by Norm Kardosh and Frank Reese from foundation stock obtained from Duane Urch, Ridgeway Hatchery, Bill Yockey's Midget White turkeys, and a strain of small hens from British United Turkeys.



Dr. J.R. Smyth

Beltsville Small Whites

- Stanley J. Marsden Beltsville Small Whites (University of Guelph, University of Iowa, Gerald Donnelly via Guelph)

Slate

- Dr. Edward Buss Slate (source of original Kardosh slates)
- Kardosh Slate (Dallas Gilbert, Jerry Klaus)
- Duane Urch Slate (Urch)

Royal Palms

- Enoch Carson Royal Palms (extinct)

Midget White

- Dr. J. R. Smyth Jr.
- Dr. B.C. Wentworth



Gerald Donnelly



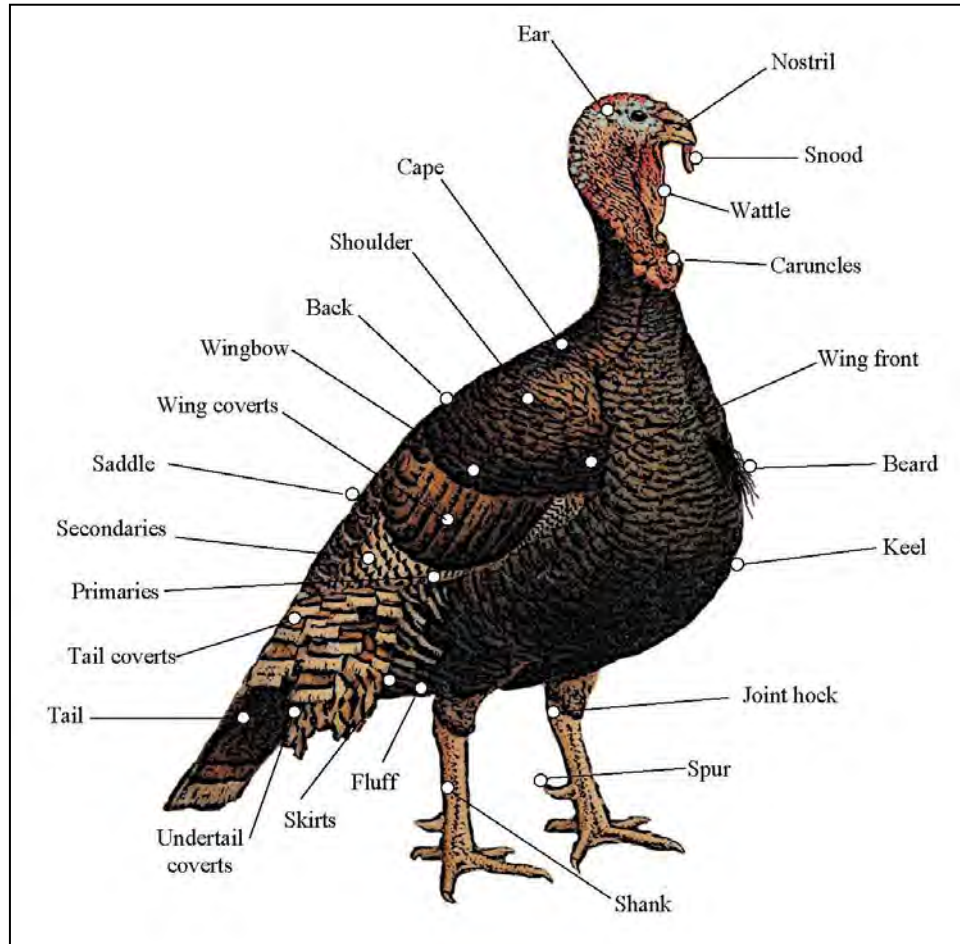
Frank Reese (left) & Danny Williamson

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Chapter 2 - Proper Conformation of the Birds

General Description of the Turkey

(Based on the American Poultry Association standards)

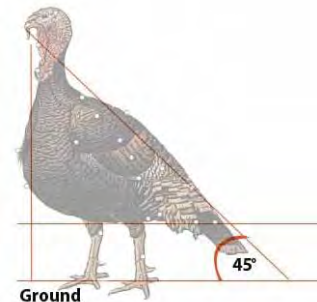


Head

The head is medium in length and is both deep and broad. Good head conformation typically reflects good breast and back conformation. On males, a masculine head (not a coarse head) is desired. Flashy prominences, called caruncles, cover the head and upper neck. The caruncles range in color from bright red to blue, flesh-colored or white, and change with the mood of the bird. At the base of the upper beak there is a naked, fleshy tubular appendage called the snood. Like the caruncles, the snood is more prominent in males than females. The snood's size and length is subject to extension or contraction, according to the mood of the bird. When the bird becomes excited the snood will become brightly colored and in males will extend several inches over the side of the beak. In females it will not extend as far. Active and colorful caruncles are a sign of health and vigor in the birds. The bird's bright brown eyes should be round and open. Alert, healthy eyes are a sign of health. Avoid blue eyes because homozygous blue genes result in blindness.

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- Beak* The beak is medium in length and should be strong so that the bird can forage effectively. The beak is curved and well set in the bird's head.
- Throat And Wattle* The throats of turkeys are heavily carunculated more so in males than females. Both males and females have large pendant-like wattles extending from lower base of lower mandible to a point down the front of neck. Overly pendulous wattles are not desirable.
- Neck* The neck is medium in length and held erect on the body. It gracefully curves along its length as it blends into the bird's back.
- Beard* The turkey's "beard" is comprised of long, bristly, hair-like feathers that protrude out of the chest of the birds. These are more prominent in adult males. They may appear in females but they are not required according to breed standards. The beard on a male can be 5-7 inches long.
- Back* The back of the bird is broad and slopes from the neck in a slightly convex curve to the tail. It is flat between the wings with its width carried well back toward the base of tail. It is particularly important to select females with broad backs and well-sprung ribs. The larger and wider your females, the larger their progeny will become.
- Tail* The tail consists of moderately long feathers that are broad and carried low in a continual and graceful line with the back. The smaller covert feathers of the tail are broad and plentiful and extend well onto the tail.
- Wings* Turkeys have powerful, smoothly-folded wings that are carried well up on their sides. Well carried wings are an indicator of good health. Feathers on the wings are broad and overlap each other.
- Breast And Keel* The frontal part of the breast is full, broad, and deep. The breast is well rounded and carried forward slightly above the horizontal. From the front, the breast should appear wide and flat. The keel, or breastbone, is 4-5 inches long in females and 6.5-7 inches long in males. It is slightly convex and should be fully fleshed throughout its entire length. Note that the keel length is similar in length to the shank of the bird. This point is extremely important for effective mating by the males.
- Body* Turkeys have a broad body that is also deep and compact. The carriage of the body is sufficiently upright so that the angle of the back is approximately forty-five degrees (45°) from horizontal from base of the tail to its shoulders. This aspect is important for fertility in that it allows the male to effectively mate. This does not mean that the body should be 'up' or carried high, but rather that the back should be at a 45° slope.



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Fluff

The fluff feathers on the underside of the body on the lower abdomen should be moderately short in length.

Legs And Toes

The legs should be medium in length, strong, straight, and of good substance. They must be filled out with flesh down to the hocks and set wide apart from each other. The feet of the birds include four toes on each foot which should be well spread, straight, and strong. As mentioned above, the shanks should be approximately as long as the keel, being 7 inches long in males and 4-5 inches long in females. Again note that this attribute is important for effective mating by the males.

Skin

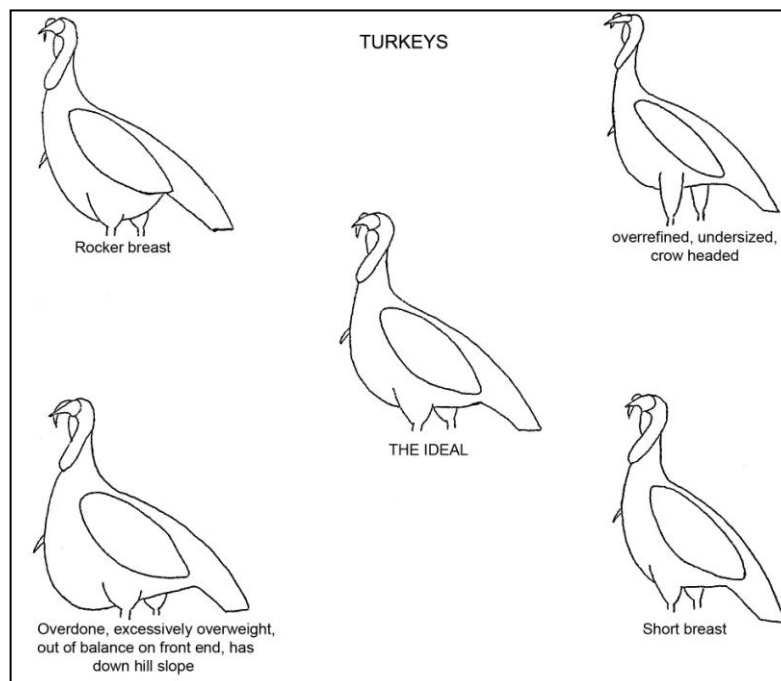
The skin of turkeys is soft and fine in texture.

Important points for breeding birds

- Longer keel and leg in males and 45° balance enables natural mating
- Select males especially for color
- Select females especially for conformation
- It takes 15-20 years to correct color and 2-3 years to correct conformation

Conformation Narrative by Norman Kardosh

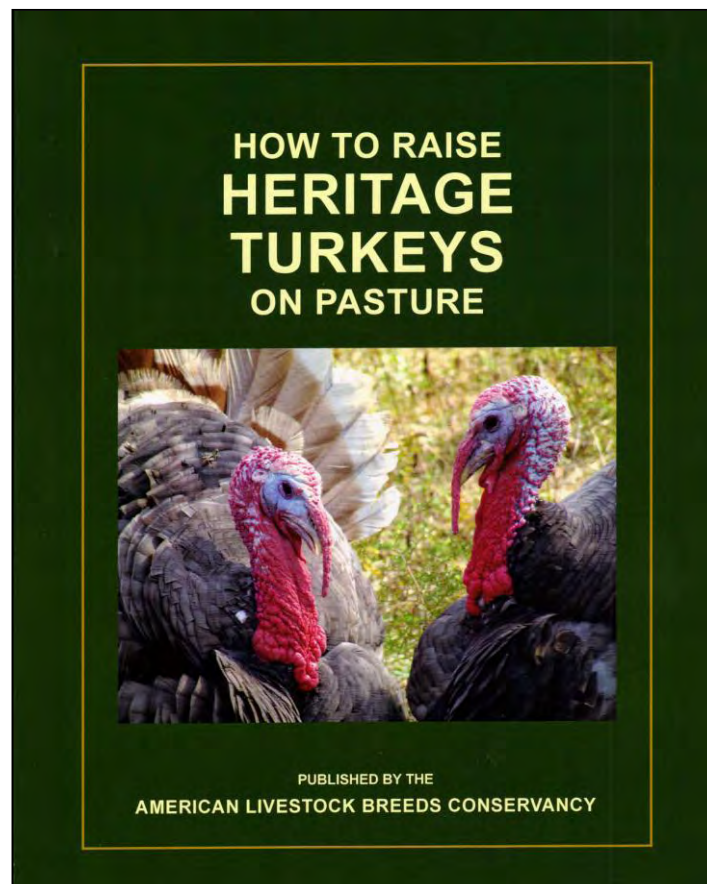
All breed types should be the same, but be sure that each breed conforms to the standard color requirements for that breed. Standard weights should be observed and maintained. Use large females to maintain size or to increase size if weight is a factor. Overweight toms should never be used because poor fertility results from clumsy toms. Toms for breeders should be young toms of good type and color mated to younger or older hens. Use old toms only when a breeding program is practiced with artificial insemination. Old toms are valuable for this purpose. Cull birds with breasts that show protruding knobs on the front, breast blisters, or crooked breasts. Also, cull birds that show crooked backs and legs, crow headedness, or shortness of shanks. Shanks must be solid and medium in length.



Selecting Your Best Turkeys for Breeding

There are many varieties of Heritage turkeys to choose from. For physical descriptions and production information on the breeds see *How To Raise Heritage Turkeys On Pasture* on the ALBC website at <http://albc-usa.org/EducationalResources/turkeys.html>. Chapter one, “Choosing a Variety and Raising Poults,” has detailed information on the breeds. This manual is free for download on the website or a hard copy can be purchase through the ALBC office.

Know your breed’s standard by becoming familiar with the American Poultry Association’s (APA) publication *The Standard of Perfection* available for purchase through the APA’s website at www.amerpoultryassn.com.



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Chapter 3 – Evaluating Breeding Stock

“Compare apples to apples” when evaluating breeding stock. Until a breeder becomes *very* familiar with the breed, it is best to evaluate birds in groups of the same age, sex, and variety. Approaching breeding stock evaluation in this systematic way will facilitate a more objective comparison between individual animals. As breeders grow in experience and knowledge, and as their hands and eyes begin to recognize quality, this approach may be relaxed. Know that master breeders spend decades developing these skills, and a systematic and orderly approach to examining each bird will help these skills develop.

You can first assess your hens at 24 weeks of age and your toms at 30 weeks of age or older. This allows you to assess them when they have reached their mature height. Evaluate all birds of the same sex at once and preferably the hens before the toms. The smaller hens will feel tiny when compared to the toms. Evaluating the girls first will help avoid discarding good specimens that just don't compare in size or stature with the toms.



Feeling for flatness of back.

Flatness, Width, and Angle of Back

The back of the bird must be consistently wide, smooth, straight, uniformly broad, and free from injury or deformity. A desirable wide back carries through from joint of wing all the way back to tail assuring that hens have ample room for reproductive organs and good egg production potential. A wide back indicates a wide breast.

A straight, flat back is an indicator of correct skeletal development. Cull birds with crooked backs. A straight, flat back with good length and width also makes for a more attractive carcass on a table bird.

The carriage of the birds should be upright and balanced at a 45° angle to the horizontal of the

ground. This ensures that offspring have proper body carriage that will enable them to breed naturally. (See pictures in Chapter 2 on pages 9 and 11.)

Heart Girth or Spring of Ribs

The circumference of the body must be large, round, and open. A large heart girth is an indicator that there is ample space for large, healthy internal organs, maximizing the bird's potential for growth and development. The girth can feel larger than it actually is if the bird's legs are held slightly forward during the assessment. For valid results, compare heart girth only between birds of the same variety, age, and sex, and be sure to measure each bird in the same place.

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Body Depth

The body from the spine to the keel bone should be deep. As with heart girth, the depth of the body indicates whether there is ample or restricted space for internal organs. Adequate depth gives birds an advantage for internal organ development. This factor also contributes to carcass appearance for the table bird. Again, assess each bird in the same place on the body, and compare only between birds of the same variety, age, and sex. Be sure that fleshing is ample to cover the skeleton so the bird doesn't appear thin.

Breast and Keel



Feeling for straightness of keel and fleshing.

The breastbone needs to be straight, parallel to back, and extend back to or between the legs when the bird is suspended. In toms, the rear tip of the keel bone turns in slightly toward the back. Examine the breast for overall fleshing. The breast should be broad, smooth, and well-fleshed to the tip of the keel. This should be accompanied by plump, well-fleshed drumsticks of appropriate size in proportion to the body.

The breast on the birds must be free of knobs or calluses. Fleshing of the breasts of hens optimally extends slightly beyond the edge of the keel, leaving a crease running along the length of the keel instead of a boney ridge. Toms have more prominent keels so the flesh will not completely cover the keel as it does with the hens. To judge ideal tom fleshing, place the bird's keel in the

center of a human hand, with the head running parallel to the fingers. Slowly close the hand over the keel covering the sides. A well-fleshed tom should have fleshing beginning where the fist knucklebones are located.

Legs

Because of the heavy weight attained by adult turkeys, they require sound legs in order to carry themselves efficiently and to breed properly. Overly-short (like a Broad Breasted White turkey) or overly-long legs can cause mating and fertility problems.

Straight and strong legs are paramount in selecting birds with good breeding potential. To test this, begin by having the bird run or walk. (This point is very important!) A well-constructed bird will move smoothly with its legs placed directly forward as it walks. They must be centrally positioned under the body for optimal balance. The legs should not be thrown out sideward and the birds should not waddle.

The shanks of the legs are approximately the same width as that of man's thumb (about 4" circumference.) The thickness of the bone is important as it is crucial to the proper support of the body. In the case of Royal Palms, they may have smaller shanks which are appropriate for their naturally smaller size.

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Breeder Danny Williamson measuring length of keel compared to length of shank.

Cull any birds with leg deformities. Severe deformities will be easy to identify but minor deformities can only be detected by observing the birds as they move.

Compare the length of keel to the measurement of the leg shank from hock (knee) to ankle. These should be approximately the same.

Shorter keel → shorter shank → short thigh

This results in smaller drumsticks and decreased ability for male to mate successfully.

Rate of Feathering and Maturation

The rate of feathering is an indicator of the rate of maturation in a bird. Individuals that mature early (22-28 weeks) will produce offspring that will be more likely to mature in timely manner for the holiday market. In order to look for feather development, part the feathers and look for signs of pinfeathers. A mature bird will have few or no pinfeathers and thick, cream-colored skin over the entire body. Cull slow maturing birds.

With normal growth, an 8 week old poult will “get its head.” This means the poult will have lost most of the down from its head, producing the characteristically clean turkey head. From 8-20 weeks the birds are always growing new feathers with new sets coming in at 8 weeks, 12 weeks, and 16 weeks of age. By 24 weeks, pin feathers will have emerged and they won’t be difficult to pluck. By 28 weeks of age, all of the new feathers should be in and completely grown. It is interesting to note that on the wings, baby feathers are pointed and adult feathers will be more rounded in shape. Select against late feathering as these birds will be slower to develop than the fast feathering birds.

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Meat Status

A tom “puts his breast on” between 16-22 weeks, meaning the pectoral muscles develop. Cull birds if their breast develops later than 22 weeks. The Beltsville Small White turkey will mature 2 weeks faster than the other varieties.

Under normal conditions, a bird should reach a degree of maturity suitable for marketing between 24-30 weeks for large- and medium-sized varieties and between 22-26 weeks for small-sized varieties. Use these same dates when selecting breeding stock. With Beltsville Small Whites, both males and females should reach market at 20-24 weeks.

Size and Weight

Birds should be the proper size for the variety, as described by the American Poultry Association *Standard of Perfection*. Examine the breed standards before assessing size and weight of birds. Rate of gain should be consistent with achieving the standard weight for a young bird according to these standards.

Turkey Variety	Young Tom Weight²	Young Hen Weight²
Beltsville Small White	17 pounds	10 pounds
Black	23 pounds	14 pounds
Bourbon Red	23 pounds	14 pounds
Standard Bronze	25 pounds	16 pounds
Jersey Buff ¹	21 pounds	12 pounds
Midget White ¹	13.8 pounds ³	8.2 pounds ³
Narragansett	23 Pounds	14 pounds
Royal Palm	16 pounds	10 pounds
Slate	23 pounds	14 pounds
White Holland	25 pounds	16 pounds

1- not a standard variety

2- weight of a bird under one year of age, as defined by the APA *Standard of Perfection*

3- weight at 20 weeks

Health and Vigor

Birds should be free from defects, deformities, or signs of disease or weakness. They must possess good physical strength and have sufficient energy to actively forage. Birds with poor vitality are likely to have offspring of poor vigor. In other words...you will get only what you tolerate in your flocks.



Newly hatched turkey poults.

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Reproduction

Hens are largely evaluated by the quality and quantity of their eggs. This is a heritable characteristic and worth paying attention to for obvious economic reasons. Hens should have good egg production, producing 60% of their eggs within the first 13 weeks of lay. The eggs themselves must have consistent quality in shell thickness and shape. At least 80% of the eggs are expected to be fertile and fertile eggs should have a minimum hatchability rate of approximately 75-80%.

Some breeders select for aggressive males as these are most driven to mate. It is then advantageous to select for receptive hens that kneel for the toms, reducing the chances of becoming injured while mating. With particularly large toms it may be necessary to use “saddles” on the hens to protect their backs from becoming injured by the toms’ toenails and spurs while mating. To use a saddle, the wings of the hen are placed through side “arm holes” of the saddle so the device is securely resting across the back of the bird. At the end of the breeding season, evaluate hens for their overall condition and vitality.

Choose hens that reach sexual maturity by 28 weeks of age and are ready to breed at the appropriate time of year. Turkeys do have some breeding seasonality which is variable with latitude and weather conditions. For example in Central Kansas the following varieties will, on average, come into lay during these months:

- Beltsville – January/February
- Bronze – February
- Narragansett – March
- Bourbon Red – April
- Black – late March/early April
- Slate – late March/early April
- Royal Palm – April or later



A Slate turkey hen

Livability

Evaluate the overall livability or survivability of the flock by selecting for health and vigor in all of the birds. This also ties in with selecting for longevity within the flock. Hens are expected to live 7-8 years with the best years for reproduction being year 2-3. Egg production will drop for the hens at 5-6 years of age. Toms are expected to live for 8-10 years with their most productive years between 2-4 years of age. The tom’s sperm count begins to drop at 4-5 years of age.

Selection Points Checklist for Breeder Birds

Genetics control the shape, size, color, and performance of the turkey. Over time your birds will become more productive and healthier if great care is given to the selection of breeder birds. Here is an overview of the key points for evaluation:

Selecting Your Best Turkeys for Breeding

1. **Balance** ✓

This should be a primary selection point for the bodies. The balanced bird is successful at reproducing, and produces a better-looking market bird. Balance is evaluated while the bird is standing and walking.

- Back at a 45% angle to ground
- Broad, deep, compact with upright carriage

2. **Breast** ✓

Check the breast first. Using your free hand, and with the resting turkey between your legs, head downward, or laying on its side on a table. Check for:

- Width
- Length of keel
- Knobbiness
- Balance
- Straightness of the keel

3. **Back** ✓

Place your hand across the turkey's back from wing joint to wing joint. Check for:

- Straightness
- Width
- Back and keel parallel to each other

4. **Legs and Feet** ✓

Check size and plumpness of drumsticks and thighs where the fleshing of the thighs should be full and round. Check shanks, hocks, and feet for the following:

- Toms should have a keel of 7 inches and the length of the shank from hock to foot should also be approximately 7 inches
- Hens should have 4-5 inch keel and the shank should be also be approximately 4-5 inches long
- Shanks and toes should be straight and strong
- Legs should be centrally positioned under the body
- Check for defects

5. **Watch it walk** ✓

The way a bird moves will help identify minor defects that might not be detected during a physical evaluation. Check for:

- upright carriage
- natural, unimpeded gait
- normal legs and hocks

Selecting Your Best Turkeys for Breeding

Faults and Defects

Watch for and CULL the following:

Body

- Knobbiness is a common defect in nearly all turkeys. True knobbiness is a condition where the flesh cuts away from the front and sides of the forward tip of the keel bone (genetic)
- Crooked back or roachback
- Narrowness especially over the ribs and especially in the hens (Remember, large hens produce large breasted gobblers!)
- Roost dent is an indentation in the keel just behind the forward tip of the keel, where the keel bone has rested against the roost. Though undesirable, it is a husbandry fault and not nearly as serious as a knob which is a genetic fault.
- Short keels (under 7" on tom and under 5" hen)
- Curved or crooked keel (genetic fault)
- Pendulous crop (genetic fault)
- Breast blister (husbandry fault)
- Off-color feathers. Males having female colored feathers, and females with male colored feathers should be culled. This can indicate some hormonal problems that you would not want to keep in your breeding flock. (genetic) Note: hens go through menopause later in life and may take on male coloration. This is normal.
- Cull underweight as well as overweight birds. Again, go to the breed standard for guidance in making this determination.



A Bronze tom with a roached back.

Legs and Feet

- Lack of bone – they need to have good heavy bone to carry their body
- Joint weakness
- Bowed legs
- Legs too short or overly long.
- Legs set either too close together (knock kneed) or too far apart
- Waddling
- Splay legged (tendency toward is genetic, can also be husbandry or a mycoplasma)
- Don't balance the body well

For the producer, healthy productive birds not only produce superior table birds but also translate into better profits through the sale of purebred breeding stock. Remember that not every bird is meant to become a breeder and only the top 10% typically make the cut. Careful attention to detail ensures that these birds are identified and incorporated into a successful and potentially lucrative breeding program for the farm.

Selecting Your Best Turkeys for Breeding

Chapter 4 – Preparing for Your First Year of Breeding

The decisions made every fall regarding which birds to sell and which to keep will have great



Master breeder Frank Reese (left) instructing new turkey owner, Craig Rogers, about selection of breeding stock.

implications for many years to come. Choose breeding stock thoughtfully and wisely. Learn from those with knowledge and experience. Get the American Poultry Association *Standard of Perfection* and learn what your breed should look like. For instance, know the Narragansett and Bronze feather pattern before you go to look at the flock. Even white turkeys have a particular shape, eye color, and leg color, so know these specifics. White Holland's have brown eyes.

If working with Slate turkeys, know that you are working with recessive color genes and what that means to maintaining the proper slate color in the flock will be challenging. Other challenges are in knowing how to

maintain the dark red color in Bourbon Reds so they do not turn orange and knowing the difference between Jersey Buffs and Buff turkeys.

Use well-matured young hens and toms each season and keep breeding stock from year to year. Always select large hens to maintain good body size within the flock. As larger hens are selected for the breeding flock the toms will become larger, too.

Do not dispose of all breeders as soon as the demand for hatching eggs subsides. While this was once the practice, it is no longer advisable. There are so few good standard turkeys left that it is necessary to hold breeding flocks over for many seasons.

Introduce new blood only when necessary to effect desired improvement. If you begin your breeding flock from genetically diverse stock, it is possible to not need "new blood" for several years or more depending on the breeding plan and diversity within your founder animals. It is best to set up a self-perpetuating breeding plan if breeding stock is producing satisfactory results and the flock is free of disease. This strategy will help you avoid the expense and dangers connected with frequent introductions of "new blood". A single large mating of 200 or more hens is self-perpetuating for many generations if a new group of young breeders is selected at random each season and mated as a single large group. The danger of inbreeding with such a plan is less than the danger connected with frequent introductions of new animals.

Favorable results from crossbreeding will show up chiefly in the first generation. Master Breeder Frank Reese does not advise crossbreeding unless the breeder has years of experience and knows what to expect. Whatever the crossbreeding might gain in the short term will eventually be lost if the breeder does not know exactly what to expect or does not understand the strategies for assuring long-term success. Potential problems can occur, such as the color pattern in the birds becoming compromised. It can take years, and in some instances may be impossible, to correct. Reese advises that you visit the breeder you are buying from and learn from them. Buy turkeys only from breeders who breed turkeys to the standards and you will have the best turkeys you can get. Remember that you must know the APA breed standards yourself before you go to the breeder.

Selecting Your Best Turkeys for Breeding

Ask the breeder about the turkeys' production potential, rate of growth, feed conversion, egg production, fertility rate, and most of all buy turkeys that have National Poultry Improvement Program (NPIP) certification and come from *Mycoplasma gallisepticum* (Mg), *Mycoplasma synoviae* (Ms), *Mycoplasma meleagridis* (Mm), *Avian Influenza* (AI) and *Pullorum/Typhoid* free flocks. When visiting the breeder look at the health of the birds and ask what the farmer's health program is for their turkeys. Also ask what biosecurity measures are in place on their farm. In most states, NPIP certification does not assure testing for Mg, Ms, Mm, and AI. Ask before purchasing. Obtain proper health papers if you are going to travel across state lines.

If you buy hatching eggs, heat treat (see page 25 for this procedure) the eggs before setting them. Never buy turkeys at a farmers market or flea market since they may carry disease, thereby being a huge biosecurity risk. If you do choose to buy birds in those venues, have them blood tested immediately and isolate them far from the birds on your farm for a minimum of 30 days.

Preparing for Your First Breeding Season

After making your breeder selections in the fall, the sexually mature birds need time to settle in to the areas in which they will breed. The breeding barns and nest boxes should be ready and in place by November. By December, the birds should be disturbed as little as possible. Caretakers can take a hands-off husbandry approach beginning that month. Depending on the breed, the latitude, and the weather, some breeds will begin to lay as early as January or as late as April. (See page 17 for more details on reproductive seasonality.)

Quality feed and proper nutrition is crucial to the fertility and hatchability of the eggs. Breeding birds must be on a breeder diet in order to assure that they are receiving the appropriate levels of vitamins and minerals. Regular feed will not contain the increased levels of these items needed by the birds during the breeding season. Breeders need to be started on a breeding ration a month prior to the start of the breeding season.

Probiotics and vitamin supplements are often added to drinking water or feed. Probiotics are beneficial bacteria that live in the gastrointestinal tract. They aid in digestion and ensure the gut is populated with healthy flora. Probiotics are particularly useful in cases where birds are stressed, such as during breeding season. Vitamins also support bird health. Vitamin C and Vitamin E are especially needed over and above normal requirements during times of stress. Vitamin E is a fat-soluble vitamin and Vitamin C is a water-soluble vitamin.



A flock of Midget White Turkeys.

Selecting Your Best Turkeys for Breeding

Below are a couple of examples of diets formulated to accommodate breeding birds:

Townline Farm Poultry Reserve Formula- 1020 Turkey Breeder

Ingredient Name	As Fed Amount	Scale (lbs.)	
Corn- ground	1137.00	1137	
SBM 48%	581.00	1718	
Lime 38%	127.00	1845	
Distillers	50.00	1895	
Ratite Premix	50.00	1945	
BIOPHOS	29.00	1974	
Fat (Animal)	20.00	1994	
Salt	6.0	2000	
	2000.00 total	2000 total	
Nutrient	Unit	As Fed	Dry Matter
Dry Matter	% of Wt.	89.50	89.50
CP	%	20.40	22.80
Sol. CP	% of CP	16.42	16.42
Undeg. Protein	% of CP	36.82	36.82
NEL	Mcal/lb	0.75	0.84
Fat	%	3.68	4.12
ADF	%	3.77	4.21
NDF	%	8.20	9.16
Effect NDF	%	0.26	0.30
NFC	%	46.86	52.36
NFC (CALC)	%	48.23	53.89
Sugar	%	5.33	5.95
Starch	%	34.00	37.99
Sol. Fiber	%	7.40	8.27
Ca	%	2.80	3.13
Absorb Ca	%	0.67	0.75
P	%	0.67	0.75
Absorb P	%	0.47	0.53
Salt	%	0.30	0.33
Na	%	0.14	0.15
Cl	%	0.26	0.29
Mg	%	0.15	0.17
Potassium	%	0.76	0.85
S	%	0.20	0.22
Elect. Bal.	Meg/100g	5.6	6.3

Walters Poultry Breeder Feed 17% protein (For 2000 lb Batch)

Weight in pounds	Ingredient Name
1244.95	Ground corn
470.00	Soybean meal Hi-pro-B
108.00	Calcium Co3
80.00	Wheat Middling
1.00	Chorine Chloride 60%
0.70	Methionine DL-98%
0.30	Vitamin E 227.000
41.00	Dical Phos 21%
20.00	M&B Meal-Cert.
10.00	Fat. C.W.
10.00	Lignin, Dried 2X 50#
8.30	Salt Mixing #50
5.00	Poultry MFG V/TM Fort
This is optional but recommended	
0.75	Histostat 50% 50#

Water

Turkeys must have access to fresh, clean water at all times. Waterers need to be cleaned twice daily and thoroughly washed with disinfectant on a weekly basis. Apple cider vinegar is reported to reduce the incidence of coccidiosis and inhibit bacterial or algal growth in the water. Add 1-2 tablespoon(s) of apple cider vinegar per gallon of water 2-3 times per week. Adult birds can drink roughly 1 gallon of water per 5 birds per day. Water intake is highly dependant on environmental factors so provide more water than is necessary to assure the birds have an ample supply.

In order to provide enough space for multiple birds using the same feeder and waterer, a good rule of thumb is to have approximately 6 linear inches of access space per bird in each of the containers.

Breeding Ratio of Males to Females

Generally speaking, healthy sexually mature males should be able to service 14-20 females. Yearling or older males will service fewer averaging 8-14 only. To further break down the ratio the following is recommended for the different body types:

- Large type turkeys – 15 hens to 1 tom
- Standard-size turkeys – 18 hens to 1 tom
- Small type turkeys – 20 hens to 1 tom

Selecting Your Best Turkeys for Breeding

Caution must be taken in monitoring the physical condition of hens that are in small breeding groups of less than 10 to ensure that they are not injured from overzealous toms. It is recommended that in this case a “turkey saddle” is used to protect the hen’s back from injury. Turkey saddles are also recommended when using very large toms for breeding. The “arm holes” of the saddle slip over each wing to hold the device in place on the back during the mating season.



Turkey saddle

Tracking the Breeding Birds

Toe Punch Guide
Hatch Year: _____

Punch		Mating		Punch

It is useful to have multiple line matings in your farm’s breeding to limit the need to add “new blood” to your flocks. Pen pedigreeing can help a producer avoid inbreeding for a longer period of time. With pedigreeing, the producer can easily track bloodlines and the traits passed on within those groups of birds. To the left is a sample of a simple toe punch tracking system that can be developed for poults from multiple matings on a farm. Begin by writing the breeding pen in which each bird is placed adjacent to its toe punch ID. This provides the pedigree of the eggs. Track the pedigrees by first marking eggs after they are collected. Incubate similar pedigree eggs as batches. Toe punch the poults as they hatch from those eggs, picking up with the next toe punch combination in the cycle. Maintain records of the toe punch guide to enable you to track family history. Visit the ALBC website’s Educational Resources page for a free full-sized printable version of the toe punch guide at:

www.albc-usa.org/documents/ToePunchChart.pdf.

When starting with adults, use wing or leg bands to track the individual birds.

Breeding Plans and Strategies

The goal of all breeding strategies is the maintenance of healthy and viable genetic resources. Many strategies can be employed to accomplish this. Below are two strategies that will enable breeders to keep their flocks closed for six or more years. They will also result in composites of the strains started with. For the health of the breed as a whole, some breeders need to maintain pure strains, which can be done using line breeding strategies. More information on that topic can be found in *Managing Breeds for a Secure Future* by Sponenberg & Bixby.

If two breeding pens are maintained, a producer can avoid having to bring in unrelated breeding stock, or “new blood” for three to six years. Each of the two breeding groups should contain toms that are comparatively unrelated to each other. The females of both groups may be of similar or different breeding amongst each other within their groups. The following text outlines a six year breeding plan based on starting with two breeding groups as described above:

Selecting Your Best Turkeys for Breeding

Example: Two Pen Breeding Plan

Year #1

Group 1: Tom A → A hens = AA toms & hens

Group 2: Tom B → B hens = BB toms & hens

Year #2

Repeat year #1 breeding

Year #3

AA tom → BB hens = C toms & hens

BB tom → AA hens = D toms & hens

Year #4

Repeat year #3

Year #5

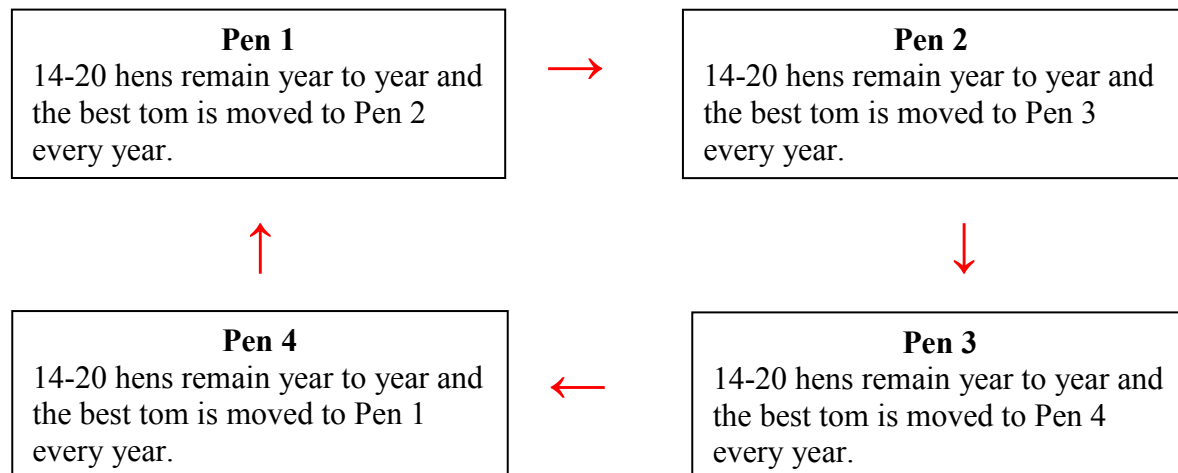
C tom → D hens = E toms & hens

D tom → C hens = F toms & hens

Year #6

When introducing new arrivals into the breeding plan, be sure the new animals are high quality stock.

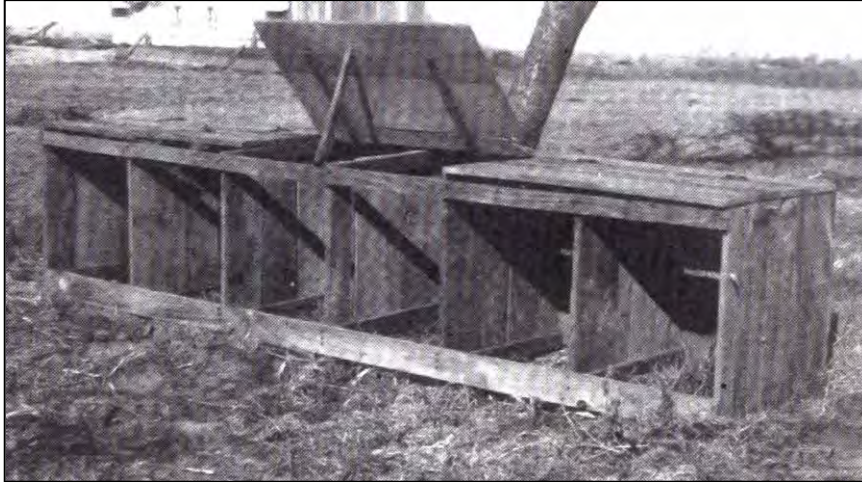
When considering maintaining more than two blood lines, a good breeding strategy is the systematic intercrossing plan as described with four breeding pens in the book *Turkey Management* by Stanley J. Marsden and J. Holmes Martin, Interstate Publishing (1939). According to the authors, when using this plan it is not necessary to introduce new blood. The producer can continue to breed from his own stock for many years without significant inbreeding.



Selecting Your Best Turkeys for Breeding

For more detailed information on the principles and practices of breeding turkeys (and everything else involved with turkey management), the Marsden and Martin book cited above is highly recommended reading. The book is out of print, but a used copy can be purchased through various online resources. The book can also be viewed in its entirety in electronic form through the Cornell University's Core Historical Literature of Agriculture digital collection at <http://chla.library.cornell.edu/c/chla/>. The book itself is over 700 pages long but it is a worthwhile read for turkey producers. It was written at a time when heritage turkeys were the mainstream for production and the principles are much the same now as they were then.

Nest Boxes



A row of nest boxes circa 1939

Turkey hens tend to want to nest in groups so there is an advantage to building nest boxes in close proximity to each other in a battery configuration as pictured here. The dimension of each box is approximately 24 inches wide, 24 inches deep, and 24 inches tall. There is a lip in front of the boxes that is 6-8 inches tall so that the bedding stays in place and eggs don't roll out of the

box. The boxes are kept at ground level and are lined with clean bedding that may consist of dry straw or pine shavings. There should be one nest box for every 4-5 hens.

Collecting Eggs

Eggs are collected at least twice a day with the smallest amount of disturbance to the hens as possible. The routine of collection should be consistent and follow a predictable pattern for the birds so they know what to expect from day to day.

There is much debate about cleaning hatching eggs. Some producers say they shouldn't be cleaned because it removes a protective coating that helps the egg combat harmful bacteria. Others are adamant about cleaning with at least warm, soapy water or an appropriate disinfectant such as Tectrol so that feces and other contaminants will be removed from the surface of the eggs. If the decision is made to clean the eggs, the water and disinfectant should be at least 20°F degrees warmer than the egg and is at least 90°F (preferably between 110-115°F). The disinfectant can be poured over the eggs or the eggs may be dipped in the disinfectant for up to thirty seconds. This action makes the egg contents swell and pushes dirt away from the pores of the egg. Washing in cooler water will force dirt into the pores of the eggs and trap contaminants as the contents contract.



A Narragansett hen in her nest box.

Selecting Your Best Turkeys for Breeding

Eggs can be stored for up to 10 days prior to incubation in an area (such as an egg cooler or closet) that is preferably between 50-60°F with a relative humidity of 70-75%. A regular family refrigerator is not recommended as the temperature within can fluctuate. Remember, cell division begins within the eggs at 72°F so higher temps are to be avoided when storing eggs.



Stored eggs propped up

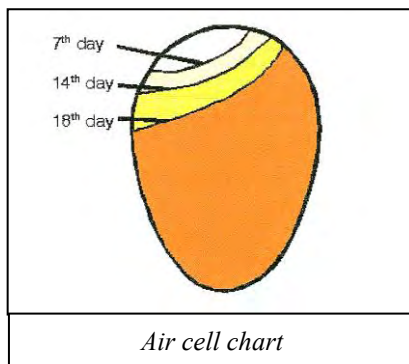
Stored eggs are placed in an egg tray with the large end of the egg up. Turned the eggs twice a day to keep the yolks from sticking to the inside of the shell. This can be accomplished by propping the tray on one side and alternating the tilt from side to side to effectively “turn” the eggs twice a day.

Incubation

Poults can be hatched naturally or artificially. Some producers will use broody hens to hatch eggs but this will limit the number of poults that can be hatched. A more efficient way to hatch large numbers of poults is to use an incubator. These machines come in many shapes and sizes.

Before setting eggs, regulate the incubator temperature and humidity and let it run for 2-3 days. After that, allow the eggs to reach room temperature before setting eggs in the incubator trays, again with the little end down, big end up. After eggs are set, the incubator temperature will drop but soon thereafter the incubator will return to the desired level.

Recommended hatching temperatures within incubators vary depending on the type of machine being used. For the more commonly used forced-air incubators, the recommended temperature is 99°-100°F for the first 22-24 days of incubation. For the last 4-6 days, the temperature is reduced to 97°-98°F. The recommended humidity is 60% for the first 24 days of incubation and then 70% for the last four days.



Air cell chart

To check on the progress of the embryo, candle the eggs after 7-10 days in the incubator to check for clear eggs or blood rings, both of which indicate dead embryos. A high number of clear, undeveloped eggs could mean infertile toms. High numbers of blood rings could mean unhealthy or old breeding stock. Remove the bad eggs to prevent them from exploding from bacterial growth and contaminating the other eggs in the incubator. Candling is also a good way to check progress in

the eggs as they further develop. With appropriate temperature and humidity levels, the air cell within the eggs should

become larger over time as described in this image.

Three days before eggs are scheduled to hatch, they must be placed on their side in the hatching tray. At this time, lower the temperature and raise the humidity to the recommended levels to facilitate hatching. After poults hatch, leave them in hatching tray for 24 hours to dry off before moving them to the brooder.

Selecting Your Best Turkeys for Breeding

Troubleshooting chart from Marsden and Martin's publication "Turkey Management."

Table 15. Incubation Trouble-Shooting Chart*

<i>Symptoms of Trouble</i>	<i>Probable Causes</i>	<i>Suggestions</i>
Many clear eggs—no blood (See Chap. 6)	<ol style="list-style-type: none"> (1) Holding too long or at the wrong temperature (2) Too few or too many toms (3) Toms too large (4) Toms inactive (5) Lice or mites 	<ol style="list-style-type: none"> (1) Do not hold beyond 14 days: Hold between 45 and 60 degrees F.—Never ship eggs that are over 1 week old (2) Have 1 young tom to 15-20 hens: fewer for old toms (3) Toms should not be more than twice as heavy as hens
Apparently clear eggs—show blood on breaking (See Chap. 6)	<ol style="list-style-type: none"> (1) Chilled before setting (2) Irregular heat 	<ol style="list-style-type: none"> (1) Warn shipping agencies to guard against chilling (2) Avoid high or low temperatures. Current interruptions are often a factor
Many dead germs (See Chap. 6)	<ol style="list-style-type: none"> (1) Eggs held too long or at extreme temperature (2) Bottom of eggs too cold (gravity incubator) (3) Insufficient oxygen in incubator room (4) Close inbreeding (5) Incomplete ration for breeding stock 	<ol style="list-style-type: none"> (1) See above (2) Warm the incubator room; check for sagging trays (3) Increase ventilation in room where incubator is kept, avoiding drafts (4) Mate closely related birds only when pedigrees are kept so that families showing low hatchability may be discarded (5) Check vitamin content of breeders ration. Feed balanced ration to breeders
Pipped eggs not hatching—too many helpouts	<ol style="list-style-type: none"> (1) Insufficient moisture (2) Hatching temperature too high 	<ol style="list-style-type: none"> (1) Increase moisture pan space; avoid too dry incubator room (2) Lower the temperature the last 4 days (particularly in separate hatches)
Hatching too early	Excessive heat throughout incubation	Use correct incubation temperature
Slow hatching	<ol style="list-style-type: none"> (1) Insufficient heat (2) Bottom of eggs too cold 	<ol style="list-style-type: none"> (1) Use correct temperature (2) Warm incubator room or lessen ventilation of incubator first 3 weeks
Dead in Shell (A) Much unabsorbed yolk (B) Yolk absorbed, embryo has "dried out" appearances	Too much heat 4th week Insufficient moisture or excessive ventilation	Use correct temperature—check thermometer <ol style="list-style-type: none"> (1) Add moisture (2) Decrease amount of ventilator opening
"Sticky" poults	Sometimes poor holding conditions (little yet known about this condition)	Avoid holding eggs during prolonged cold spells
Cripples and spraddles (legs bow out)	<ol style="list-style-type: none"> (1) Temperature too low throughout inc. period (2) Cloth or paper on nursery tray is too slick causing poults to slip and injure themselves 	<ol style="list-style-type: none"> (1) Use correct temperature (check thermometer) (2) Use muslin or netting type cloth on bottom of nursery trays

*Prepared by the junior author for the Jan., 1938 Turkey World.

Selecting Your Best Turkeys for Breeding

Methods for brooding and growing out the young birds can be found in the ALBC publication *How to Raise Heritage Turkeys on Pasture* which is free for download on the ALBC website at <http://albc-usa.org/EducationalResources/turkeys.html> . Hard copies may be purchased through the website or by calling or emailing the ALBC office at 919-542-5704 or albc@albc-usa.org.

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American Poultry Association – p.12 *APA website logo*

Marjie Bender – p.8 *Frank Reese & Danny Williamson*, p.14 *straightness of keel*, p.15 *length of keel and shank*

Jeannette Beranger – p.1 *Bronze turkeys*, p.2 *Royal Palm toms*, p.4 *Historic Holiday card*, p.8 *Gerald Donnally*, p.13 *flatness of back*, p.17 *Slate turkey hen*, p.19 *roach backed hen*, p.20 *Frank Reese & Craig Rogers*, p.21 *Midget White turkeys*, p.25 *Narragansett hen*

Raymond Boisse – p.8 *Dr. J.R. Smyth*

Gra Moore – p.25 *egg crate*, p.26 *air cell chart*

Frank Reese – p.6 *Norman Kardosh*, p.11 *ideal turkey chart*, p.16 *newly hatched poults*

Marsden & Martin's *Turkey Management* – p.27 *troubleshooting chart*

Turkey World Magazine – p. 6 *George Hackett*, p.7 *Stanley Marsden, Mrs. Ole Carson, & Sadie Caldwell*, p.8 *Mrs. W.T. Hall & Henry Domes*, p.25 *nest boxes*