



MODULE 3: BREEDING

Disclaimer

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without written permission from the author, except for the inclusion of brief quotations in a review.



A complete winning blueprint to racing success

..... 1

Breeding 7

Types of Breeding..... 7

Types of Breeding..... 7

Cross Breeding..... 7

Inbreeding 7

Line breeding..... 7

Out Crossing 8

Pairing Up 8

Pairing Up 8

Early Mating 8

When to start the breeding season..... 8

Lights and temperature..... 8

The Laying Cycle 9

5 Days 9

10 Days 9

28 Days (18 days after laying) 10

44 days (16 days after the 1st round hatched) 10

49-60 days (Weaning the 1st round).....	10
62 days (18 days after 2nd round is laid)	10
Banding a Youngster.....	10
What is a band?.....	10
When to band.....	10
How to Band a Pigeon	11
TIPS	11
Selecting Breeders.....	12
Overview	12
How much do they inherit?.....	12
What is a strain? A great debate	12
Evaluating your Birds when selecting breeders.	13
1. Racing Performance.....	13
2. Breeding Performance.....	14
3. Physical Characteristics.....	14
4. Behavioral Characteristics.....	15
5. Pedigree	15
6. Relationships.....	16
Conclusion	16
Finding Stock Birds	16
Overview	16
Sources	16
Auctions.....	16
Commercial Breeders	16
Friends	17

Associates.....	17
Established Fanciers.....	17
Your race team.....	17
Suggestions.....	17
Evaluating Breeders.....	18
Overview.....	18
Things to Consider.....	18
Hard Facts to Swallow.....	19
Create a System and Standard.....	19
Creating "Sports".....	19
Overview.....	19
Purpose.....	20
Record Keeping.....	20
Annotations.....	20
Master Breeding Log.....	21
Intensive Breeding.....	21
Master Breeding Log and annotations.....	22
Intensive Breeding Theory.....	24
Overview.....	24
Process.....	24
Refining Continued.....	25
Intensive Inbreeding "A Practical Discussion".....	26
The Importance of Record Keeping.....	29
Breeding Records:	29
Racing Records:	29

Season Records:	31
Conclusion	31
Fostering.....	31
What to consider in foster parents or “Pumpers”	32
Summary	32
Genetics; Chromosomes and Genes	32
Chromosomes	32
Sex Chromosomes	33
Genes.....	33
The Gene Pool	34
Chromosomes and Genes	34
Gene Pool	34
Steps to Developing, Maintaining and Improving a Gene Pool	35
Gene Pool -- Two modes; Static and Dynamic	35
Step 1: Isolate the Gene Pool	35
Step 2: Refine the Gene Pool.....	35
Step 3: Manipulate or Recombine the Gene Pool.....	36
Step 4: Improving the Gene Pool.....	36
Gene Pool Lag.....	37

Breeding

"Breeding is about creating potential."

This eBook will cover everything regarding breeding of pigeons. There are many methods but everyone has the same goal. To produce a winning racing pigeon, breeding is of itself an art separate from the art of racing pigeons. Just look at all the fancy breeds of pigeon, dogs, and other domestic animals. They are judged on a standard and master breeders learn to breed to that standard. Ask 10 top fliers about what they prefer in a racing pigeon and you will get ten different answers. There will be some things almost all of them agree on, such as balance, feather quality, etc. There will be things that they don't agree on, such as size and weather they consider such things as eye sign.

When we look at the performance breeds there are many examples such as roller pigeons, race horses, rodeo bulls, greyhounds for racing etc. It often helps to look outside the world of just pigeons to gain some insight. If you know a successful fancier who has bred a fancy pigeon that has produced show winners, there may be knowledge available to you that will benefit you towards breeding performance.

Our goal is to breed potential. Once the egg is laid, a bird is affected by the environment at every stage of its life. Various genes are triggered by environment as well, after breeding the care and development of potential champions is in our hands. From that point onwards, it's what we teach them, how we care for them and how we manage them that determine if they can reach their full potential. But, if we can't breed potential, we are just wasting our efforts.

Types of Breeding

"Mate your best to your best!" Plato on breeding

Types of Breeding

Cross Breeding

This mating and breeding of unrelated or birds that is so remotely related that it cannot be discerned within a few generations of the pedigree.

Inbreeding

This is the mating and breeding of birds that are very closely related, for example mother x son, father x daughter, brother x sister, aunt x nephew, grandfather x granddaughter etc. Birds that are of the same strain or family name that are bred together is not inbreeding. A close inspection of the pedigrees can often show that birds of the same strain show no common ancestors within a 4 or 5 generation pedigree. Another example of very intensive inbreeding can be found in Rotondo on Racing Pigeons, by Joseph Rotondo & Silvio Mattacchione. Another great resource of information can be found at Principals of Inbreeding.

Line breeding

This is inbreeding except with a methodology. It is a process of taking children and mating them back to their parent or grandparent and then taking their young and making them back again to another grand

parent or parent. A fantastic example of this can be found in Line Breeding for the Pigeon Fancier, Chas.Siegel & Son and also Intensive Line-Breeding by M.H. "Dad" Paget. To my knowledge both of these are still available.

Out Crossing

This is when you take birds that are inbred or line bred for a few generations and then you mate them to unrelated birds. Often the goal is to produce birds specifically for out crossing. After an out crossing a hybrid vigor is expressed particularly when out crossing two birds that are both highly inbred or line bred from different foundations.

Pairing Up

"I think I'll settle down."

Pairing Up

If you are breeding with a strategy and not by chance the art of pairing up is essential. When breeders are not producing young, cocks and hens must be separated to enable you to reintroduce them to new mates when you enter the next breeding season. For systems such as intensive line breeding and intensive inbreeding, you will be changing mates often.

Early Mating

Here in the United States many fanciers pre-mate their birds in late November. This is to ensure a pair takes to each other but the birds are either allowed to brood wooden eggs. This makes putting the birds together much easier in the spring or after the first of the New Year. After the pairs have taken to each other you can separate them again until the actual breeding season begins. In some parts of the United States it is still extremely cold early in the year and once the weather settles to the right condition, there isn't much time to waste. There is nothing more frustrating than pairs that don't take to each other or switch mates.

When to start the breeding season

For fanciers that are breeding for futurities the trend is to breed almost immediately after the New Year. Often birds are banded on New Year's Day. The belief is that those young birds being the first sent to the futurity will have an advantage.

The best way to decide is to look at the date for the beginning of your club's young bird season and count backwards to include the time necessary to train. This is different for each fancier. Then count back again to allow the birds to hatch and mature to an age when they can be trained. Often in my club, the date to pair up the birds is Valentine's Day, February 14th. Kind of ironic that the holiday coincides with when we want procreation in the loft to begin.

Lights and temperature

The length of daylight (or artificial light) and the temperature have an effect on when the birds will desire to mate and breed. In Nebraska we have wild swings in weather and temperature. It's not

uncommon to get a short warm spell and watch the birds get excited and want to start mating. Then we can have a cold snap of sub zero night temperatures in the middle of February or even beginning of March.

I suggest putting the lights in your loft on an automatic timer. Set the total time for the lights for between 16-18 hours. Start the lights about two weeks before you plan on pairing up. This will reset the breeder's biological clock and get them ready for the breeding season. This biological clock not only affects their instincts but surely must set into motion a set of necessary biological functions as well.

Temperature is something that is harder to control depending on your financial means. If you have a loft that is not temperature controlled (like mine) and you have breeders on eggs. I suggest feeding the breeders twice a day. This increases the chances that the eggs will not be unattended for any amount of time that will jeopardize them. It will also reduce the number of youngsters that get "chilled" in the nest.

You will know if a youngster got "chilled" by examining their flight and tail feathers. If a bird gets severely chilled there will be a line across the quills in all flight feathers at the stage the bird was at in development at the time it got chilled. Often the flights and tail feathers will break off at that point within a few weeks. That bird is done for racing, training and will probably not ever amount to much as he will miss training when learning ability it at its highest.

The Laying Cycle

Vicariously planned parenthood!

The time line for the laying cycle begins with pair up or mating.

5 Days

After mating the cock should start driving the hen. This is seen by the cock chasing the hen around the loft from perch to perch in his attempts to get her to the nest. Instinctively he knows eggs are coming soon and he wants to ensure she lays them in his nest bowl. To the cock this is his distinct territory that often is defended at all cost, (a huge motivator when racing on the natural system). Sometimes the hen is driven so hard the cock will barely allow her to eat or get a drink. If a cock becomes too aggressive you may have to remove him for short periods of time such as feeding time.

10 Days

The hen usually lays her first egg on the 10th day. This often occurs in the evening hours around 5pm to 7pm. This can be affected however by how early or late lights are on if artificial lights are used to increase daylight. The 2nd egg is usually laid 45 hours later in mid-morning. For each hen, this can be slightly different. When the hen lays the first egg it is not uncommon for her to not pay much attention to it. This is not a problem unless you are breeding when it is extremely cold. If breeding in extreme cold the first egg can freeze. The reason for ignoring the first egg is that development starts at just the right temperature after the hen starts brooding. By waiting until the 2nd egg is laid the eggs should

develop and hatch at nearly the same time giving both youngsters an equal chance at survival.

28 Days (18 days after laying)

This is when the first round will hatch. Depending on the environment and how "tight" the hen set on the eggs will determine how close together the eggs will hatch. During cold weather if the hen started sitting immediately on the first egg, it can hatch up do a day before the 2nd egg. In an ideal environment, the 2nd egg will hatch within hours of the 1st egg.

44 days (16 days after the 1st round hatched)

16 days after the first eggs hatched the hen should be laying her 2nd round. At 16 days the first round are not ready to be weaned and the bird will require a 2nd nest bowl. If not provided a 2nd nest bowl it is not uncommon for the pair to kick the youngsters out of the bowl but within the nest box to lay the 2nd round. Sometimes a youngster will sit on the eggs if left unattended. Don't let this alarm you and it is rare.

49-60 days (Weaning the 1st round)

The first round can be weaned anywhere between 21 and 30 days. Most experts don't recommend weaning any earlier than 21 days and any later than 30 days. Sometimes the youngsters will jump out of the nest and start to wean themselves before 30 days. You will have to decide at what age is the best for you to wean youngsters.

62 days (18 days after 2nd round is laid)

This is when the 2nd round will begin to hatch. You can start to see the cycle now. After each round hatches, 16 days later another round is laid. While additional rounds are laid, there are still youngsters in the nest. This is Mother Nature's way of trying to get maximum procreation while the environment is best for the survival of the young.

Banding a Youngster

"I am not a number!"

What is a band?

A band is a seamless metal band that is inserted onto a squab's leg and becomes its permanent identification. The band has a number that is unique to the pigeon. In the United States a band usually has a format that shows the year the bird was born, the national union he will compete in, the club identification letters and then a series of numbers issued to the fancier. The club holds the master list of which numbers were issued to which fancier. An example would be AU08CIRPC0743. "AU" is the American Racing Pigeon Union, "08" is for 2008, "CIRPC" is the letter designation for the Cornhusker Invitational Racing Pigeon Club and "0743" is the unique number assigned to the fancier. In this case 0701-0750 are assigned to my loft.

When to band

In racing pigeons, young birds are banded with a seamless metal band. Since the band is seamless it

can only be put on a pigeon while it is still in the nest. Within a day the bird will grow rapidly enough the band will never come off the left unless it is cut off. Banding usually occurs between days 3-5. The size of the squab's leg determines when this can be done. Sometimes one nest mate is larger than the other and it's ready to band yet the younger sibling might have a day or two to go.

How to Band a Pigeon

I will add pictures to this section soon to assist anyone doing this for the first time. Two things to consider, First you want to be consistent in how you band birds. You can put band on so when the bird is standing it the number is right side up or upside down. Why upside down? When you are holding the bird to your chest holding the feet out with your thumbs such as when counter-marking, you can read the number as it will appear right side up to you. It's also much easier if you always put the bands on either the left or the right leg, as long as you are consistent.

1. Step one
Take the three long toes and insert them through the band.
2. Step two
As you slide the band up the three toes will then reach the pad of the foot. Continue to slide the band.
3. Step three
Then you start to reach the back toe which will be pointing away from the band. Continue to slide until you are past the pad. You should have the band now around the left and the back tow will be bent backward with the toe nail sticking out the top and the base of the tow past the band near the pad.
4. Step four
"The tricky part" Now you want to grab the base of the back tow and pull on it gently until the tow slides out from the band. You will be surprised how flexible the tow is at this stage. Sometimes when you pull the squab will experience discomfort that will be expressed by a slight gasp, vomiting or sudden excretion. You should now have a banded pigeon.

TIPS

Often you will be banding as late as possible. If you put the band on too early there is a chance the band can come off, or be pulled off by the parents. I have witnessed a parent take the band in its beak, fly out to the fly pen and drop it out of the fly pen.

Can't get the band past the fourth toe!

Use Vaseline on the foot and inside band to assist in getting it to slide over the base.

When the band is slipped past the pad and the base of the fourth tow is sticking out, use a feather, a paper clip, a pine straw needle or anything similar. Slip it through the back of the fourth toe, between the toe and the pad of the foot. Pull on it and the toe will start to slide out from the band until it is free or far enough you can pull it by hand.

The band keeps coming off!

If you can tug on the band and pull it off easily, wait a day and attempt to band again.

Use a drop of super glue between the band and the leg. The band will stay long enough for the bird to grow into it will not hurt the pigeon.

Selecting Breeders

"Like begets like.... or does it?"

Overview

An entire volume of scientific information is available on the subject of genetics one can easily get lost. What most pigeon fanciers want to know is; how do I breed a champion racer? Unless you have lots of spare cash to invest in breeders every year or a young bird kit from top pigeon fanciers, you need to learn to select breeders from among your own team and learn various breeding strategies. As mentioned previously, there is in-breeding, line breeding and out crossing from those systems. There is also the philosophy of just merely mating your best to your best. For the most part, look at most pedigrees of winning pigeons and you will not necessarily find birds that are line bred or in-bred. Most will have pedigrees filled with race winners, diploma winners or at least birds that are descended out of great pigeons. Some birds in those pedigrees might not have any wonderful achievements themselves, but are related to birds that do. Why would that matter? It might matter because those birds have a chance of carrying some of the genes that made the champions they are related to, great birds.

How much do they inherit?

When you look at yourself, you are 50% of your father and 50% your mother but there is 50% of your parents that you did not inherit from either of them. When you have children, you will pass on 50% of your genes to each of them. Theoretically, it's possible for any two of your children NOT to inherit any of the same genes as the other. Relative to your parents, your children would only inherit 25% of any of their original genetic material. Great grandchildren would then only have 12.5% and great great grandchildren would have a mere 6.24%. That's pretty minute. Now, look at some of those pedigrees that you may have yourself or have seen. It starts out with a grandchild of "So and So". So this breeder will have only 25% percent of the genetic material that the champion ancestor possessed. That would make anyone take a harder look at the other 75%. It would be important to have another breeder that also possessed at least 25% of that genetic material. If you only have the one grandchild breeder of the champion, your best approach is to start line breeding if he proves to be a producer of good pigeons.

What is a strain? A great debate

If you've been a fancier for a few years, you quickly learn about all the flashy strains. At any one time, certain strains are hot or new. Then there are the old strains which old timers will tell you are the way to go. The literature out there refers to strains as though they are completely different breeds of pigeons. With our pigeons, it's not like with other domestic animals such as dogs, cattle, poultry etc.

The only breed difference is between fancy pigeons, like the tippers, rollers, fantails, pouters etc. Take any homing pigeon of any "strain" and mate them together. You will get a homing pigeon. So where did the word "strain" originate? Sorry, I have no idea. I can only say that strains are named after fanciers. In the pigeon world, if a great fancier had a winning family, soon after others rushed to purchase birds they refer to them as "such and such" after the name of the fancier. Some fanciers, such as the Janssen brothers, would purchase new stock and put them in their loft. They would then always be referred to as Janssen's even though they originated from outside of their loft. One thing that you could say that was also true though, those outside birds conformed to the selective standards of the Janssen brothers.

I think everyone than could agree that "Strain" refers to a family of pigeons descending from a common source. My definition then of a common source is a foundation loft in which the birds were selected by a standard and uniform criteria. So what happens when a "Strain" then is sold and flown by another fancier, and then another fancier, and then other fanciers and so on? At which point do we agree that those birds though descended (greatly) from a common source has now, through various transition lofts, been exposed to other criteria which can NOT be exacting of the original source? Can we truly now call them a strain? I personally do not think so. They may still be great pigeons, because they have passed the standards in each successive loft and each of those fanciers may have been very selective and maintained the quality of the birds, but I do not feel that the term "strain" by logical standards would apply.

I think as an industry of pigeon sales, we attach the term "strain" and we maintain it in order to sell pigeons, or to have other think highly of our pigeons. When someone has a multiple race winner one of the first questions asked is "Oh what strain or family of pigeons do you keep?" Most fanciers then respond "Oh, it's a Fabry, Janssen, Leen Boers, Wegge" or whatever "strain" may have been introduced into that fanciers loft. I think it's time that great fanciers, ditch the "strain" names and once a bird has met their standard, bred to their standard and they have sold stock, it ought to be named after them. It's time we have "strain" names buzzing through the auctions named after the All American or President Cup winners in America of today!!

Evaluating your Birds when selecting breeders.

So what should we look at when evaluating our own birds to select breeders? There are six areas to which we should look.

1. Racing Performance

Chances are better that you will produce a winning pigeon if you are breeding from birds that are winners. In racing pigeons, we are selecting for so many factors many of which cannot be seen or detected when holding a pigeon in our hand, or viewing them on a perch. There is a variation of genetics, from muscle quality, organ quality, the ability to orientate and find home, inherited behaviors such as a fierce determination to get home. We as fanciers select for physical characteristics we can see. The basket and the races select for the qualities that we can't see.

Using this logic, we must assume if we want a leg up on selecting for breeding quality, we have to also

look at racing performance.

2. Breeding Performance

Which is worth more, one pigeon out of ten that is a "sport" or a champion or ten that are above average? This is a question we must ask ourselves. When evaluating our birds breeding performance we must set a standard. I think it's a wrong standard to select on merely the number of birds bred versus how many of them remain on the team. We must set a higher bar and look for those that produce diploma winners, even if a good number of their youngsters get lost in training. That's selection working for us. The basket training is selecting the youngsters that did not inherit the right combination of genes, while the diploma or point winners, though few have inherited the right combination. If you do not have an abundance of diploma winners, than look at how many birds are first or first of three to the loft. Start there set a standard and maintain it, If you improve enough to set the bar higher, than you are doing something right.

Don't select from only one mating. Before you give up on a breeder, mate it to at least three different mates. Often times, you are looking for a good "nitch". Sometimes, two birds genetically are not a good match and are passing on genes that do not complement each other or are passing on similar deleterious genes. After you have mated them to several different mates and they are not producing to your standard, remove them from your program.

3. Physical Characteristics

Look for birds that meet your preferred physical characteristics. A good breeder will be balanced regardless of size. They will have good feather quality. A breeder must be healthy. Breeding stresses a pigeon and a pigeon under stress will not breed to his/her potential. The eyes should be clear and the wattle snowy white. Some breeders are prisoners or have been prisoners for some time. Muscle tone and physical fitness is not maintained in a prisoner pigeon that is not out flying nearly daily. Also today when there are so many birds of prey attacking our homing pigeons, only a fool would let their best breeders loft fly and take the chance that a Cooper Hawk or Goshawk would take them down. As angry as you might be, the predators are protected and if you send the bill to Uncle Sam, he's not going to compensate you for your loss. If you are looking on the race team, and you are selective with the race team, they should already possess the physical traits you are looking for.

I prefer a bird with longer wings; I like the tips of the tenth flight feathers to reach within 1/2 inch of the tail bar. I want a roomy throat. I don't like birds with long necks. I prefer a shorter roomier neck. I want the muscles and air sac to be supple. I like a broad rump area and a strong back. I like a pigeon to feel like a piece of pie when I hold them. A bird must be balanced, both when viewed standing on a perch and when held in the hand. I like a bird that is well feathered over the keel. Sometimes I get birds that are not thick feathered in that area and none of them have ever flown to standard. I like the lower mantle of the tail to be thick. I like wide and longer secondary feathers on the wing. Just like the tail, I like the lower mantle on the wings to be thick. I like the ear holes on my birds to be well feathered. Any birds that do not have well feathered ear holes have never proven to be of value. I am not a subscriber to eye sign at this point in my hobby so I make no selection based on eye sign. I like

the eyes to be clear, but clarity of the eye is a sign of health.

4. Behavioral Characteristics

You should select breeders if possible that have good behaviors. I believe many of these are inherited if not genetically, also directly from the parenting of youngsters. I prefer a bird that is calm in the loft. I like a bird that has a very strong desire to defend its nest, eggs and youngsters. I want breeders that are excellent nest builders. I like to make my old birds collect their own pine straw from a container on the floor just so I can note who works harder at building a nest. Sometimes they really surprise me with huge towers of straw in a nest bowl. It also keeps them busy. If you are selective and remove birds that have bad behaviors on the race team, such as those that are lazy and don't loft fly well or those that despite your efforts do not trap well, then breeders from your race team will have those positive behaviors that you desire.

5. Pedigree

First some clarifications must be made about pedigrees. First, a pedigree is only as honest as the man who wrote it. Secondly, infidelity is a scientifically proven fact in racing pigeon lofts. It would be worth your time to read the following: *The Pigeon Breeder's Notebook: An Introduction to Pigeon Science*, by Joseph W. Quinn, Copy-write 1971, *Illegitimacy in Pigeons*, pages 110-112. It reports 2-17% illegitimacy depending upon the types of nest boxes that were used. In a racing loft, we are more concerned about space and types of nesting boxes to motivate our birds. If you are a natural flyer, be warned there is a level of illegitimacy in your loft. But, when you are selecting from your own race team, you are selecting for traits that your birds already possess, where even if you are purchasing a bird with a guaranteed pedigree, some traits you desire may not be in the genetics at all.

I advise everyone to visit Ron Huntley's Rare Colored Pigeon website but also to read his "[The Ten Commandments of Every Pedigree](#)" This is a great example of knowing your basic genetics, color, pattern inheritance etc. can help you determine errors in pedigrees or illegitimacy.

If you are confident with your pedigree then look for ancestors that meet your standard. If you are breeding for a long distance bird, you want a pedigree full of long distance birds. Unfortunately a lot of pedigrees only list famous names of famous champions in a family of birds. You might have to do your research to find out exactly what kind of distances those birds were flying and that can be difficult when dealing with imports. I really like to see common ancestors on both the Dam and Sire side of a pedigree. I especially like to see signs of in-breeding or line breeding in a pedigree. Mind you though, if you are looking back two or three generations and though descended from champion ancestors, those recent few generations have only been stock birds, there is a chance something has been lost. If you have a pedigree from an actively flying loft and there is in-breeding and line breeding which has produced scoring birds, I would consider it a very valuable pedigree.

Remember, regardless of the pedigree, if a bird cannot produce anything valuable, it has no value to you as a breeder!

6. Relationships

Look for relationships when breeding. Try to cross birds that are as related as possible. Matings such as Uncle x Niece, Cousin x Cousin, Grand Father x Grand Daughter are valuable. It increases your chances of producing homozygous positive traits. If you are into using the line breeding of Joe Rotundo or the line breeding of M. H. "Dad" Paget then relationships are extremely important. If you do not have birds that are related within two generations but you do have birds that are of the same or share the same "strains" then match them up. Yes, earlier I wrote a rant about the use of "strains". It's a shot in the dark, but you have a better chance of getting homozygous traits than two totally unrelated pigeons from two totally unrelated strains.

Conclusion

With all of this, you are not guaranteed success. In summary there are really two goals to breeding, First to breed to maximize potential and secondly, to "breed up". That is, your goal should always be to improve your stock. This is done by strict selection to eliminate deleterious traits from your gene pool, as well as attempting to create birds homozygous for beneficial or desired traits. Finally, if you can find or purchase stock that will improve your gene pool, of course do so. Just remember, victory starts in the breeding loft.

Finding Stock Birds

Overview

Most new fanciers breed from their race team. It is an economical approach and reduces the number of birds one must own in order to race pigeons. Eventually, an excellent pigeon will distinguish himself and the fancier no longer wishes to risk him on the races but wants to exclusively breed from the bird in the hopes of producing another one or twelve exactly like the bird. Now you have crossed into the realm of the stock loft. The stock loft is the gene pool from which your future race birds will come. Winning usually starts in the stock loft. If you plant inferior seeds you will get an inferior plant. Start with inferior breeders you will usually get inferior racing pigeons. If you are going to invest in a stock loft, do your homework, do your research, search your various sources and get birds that have the potential to do well on the system you fly, the type of course you compete and at the distances you wish to concentrate on. You may even decide to keep two or three different families in the stock loft.

Sources

Auctions

You will find auctions at the conclusion of futurities, after the death of fanciers who don't have descendants that wish to continue their hobby, on-line auctions almost daily and at shows. The birds will vary from young birds to older breeding pairs.

Commercial Breeders

These are the breeders that commercially breed and purchase stock solely for the purpose of selling children and grandchildren. You will often be able to visit them year round and find a supply of birds

available for purchase. You will also be able to purchase entire young bird kits.

Friends

Trusted friends often give "gift" birds or breeders of excellent quality. An honest man/woman will take pride in the achievements of others from birds that came from them. When I use the term "friend" I am not throwing it around loosely.

Associates

These may be people you already know or just met from a pigeon club. In some clubs, members often volunteer to breed some young birds to get a fancier started in pigeons.

Established Fanciers

These are fanciers that have been competing for a number of years, with a proven family. You can usually get birds that are related and have a proven record or are out of proven performers.

Your race team

If a bird had proven themselves to score and compete on your own race team, it's an excellent candidate for the stock loft, regardless of pedigree. It may prove to be an excellent breeder and if not, you have lost no investment.

Suggestions

1. Do your research. Select a strain or family that conforms to the way you want to fly pigeons and the goals you strive to achieve.
2. If you have decided on a family or strain, know the ancestors that were either champion performers or producers of champion performers within that strain.
3. Set a budget and buy the best quality within your budget and not the most quantity. One single superior breeder is far more valuable than a group of lesser value though excellent breeders. It's much harder to breed "up" from a lower quality than to use breeding strategies to reproduce an already existing specimen.
4. If you are going to spend money on young birds, buy a kit or group and fly them. There are traits a specimen may possess that only the basket and races can eliminate. They may look great in the hand but be worthless in traits necessary for racing. It's far better to lose them before you invest time, money and talent on them in the stock loft.
5. Try to purchase related pigeons, rather than pigeons that are labeled as the same strain. Your chances of producing birds that are homozygous for the same traits increase dramatically and you should be able to attain a standard in the breeding loft more quickly.
6. Test Breed. If you already have proven breeders and are attempting to improve your stock, breed a new purchase to proven birds. If they do not produce your standard with proven birds,

then you can discard them.

Evaluating Breeders

Overview

It's easy to evaluate racers. They either, win, diploma, score in the points, are also ran's or get lost. Breeders are an entirely different matter. In order to properly evaluate them, you have to keep accurate breeding records, you must have a breeding strategy and you have to be willing to be critical. You have to look beyond a pedigree. A pedigree is merely a record of ancestry. There also is always the chance that infidelity occurred somewhere in the pedigree undetected and certainly not deliberate. What matters with a breeder are results, think of the stock loft as a choke point in the evolution of your family, this is where the standard must be set. My friend, Chuck Hennessey once said "A pedigree is only worth the paper it is printed on." In that conversation, we were talking about a breeder he had given me. I was unable to produce anything of value out of the bird. It had an absolutely beautiful pedigree going back six generations. I didn't want to insult Chuck since I had received the pigeon from him, but I was being honest in my results. That single statement, from an experienced fancier, mentor and friend, has sat in my mind ever since. Forget all about pedigrees when evaluating breeders. Pedigrees are only valuable when evaluating a purchase or deciding pairings based on a breeding strategy that requires knowing relationships between birds. Performance of offspring is the primary and most important factor in evaluating breeders.

Things to Consider

1. Breeders have two sets of genes. Those that are expressed and those that are dormant or recessive. They pass 1/2 of these to their offspring whom also receive 1/2 from their other parent. A gene that may be recessive in the phenotype of the breeder may be expressed in the offspring. Also some positive traits in the breeder may be expressed but recessive and not expressed in the offspring, though genetically still present in the offspring's genotype.
2. Have you produced offspring with this breeder from more than one mate? It is best to produce offspring from several different mates before evaluating their worth. Best of all is to test a breeder on proven mates before making this decision.
3. How many young have you produced? It's hard to make a decision based off of one round or one season of young birds. If you mate a bird to three different mates and breed two rounds a season, you would have 12 youngsters from which to evaluate a breeder. If you keep accurate records, you will know, how many were culled or lost, and what was the highest quality produced.
4. Quality is worth more than quantity. A breeder that produces one champion out of 12 young is far superior to a breeder that produces 8 good racers out of 12 young. The highest quality achieved is more important than the number of birds out of those hatched that make it to the

old bird team.

5. Pedigree is irrelevant

Hard Facts to Swallow

1. Pedigrees are not always accurate and are not part of the equation in evaluating a breeder. "A pedigree is only worth the paper it is written on."
2. Like does not always beget like. A champion performer is not always capable of producing another champion. Blame it on the genetics.
3. Do to genetics and our limited ability to observe only the phenotype....breeding will always be an art, never a hard and fast science.
4. Deleterious genes do exist dormant in champion birds. If you in-breed, line breed, or breed loosely related birds, you may get results that are less than the standard. **DO NOT FREAK OUT!!!** In-breeding and line breeding strategies are designed to reveal recessive deleterious genes, so that those specimens can be eliminated. It does not mean that your stock is "tainted". You could out cross for numerous generations and pass on an undesirable gene for decades and never know it.
5. The money spent on a breeder does not determine its value. A \$1000 purchase could be outshined by a \$25 purchase if the genes are right and the pairings are complimentary.

Create a System and Standard

Once again, there are no hard and fast rules. Set a standard of what you expect out of your stock loft and stick religiously to it. Any breeder that cannot produce to your standard after you have given a reasonable effort should be removed. Have a system for continually replacing your breeding stock. If you purchased 10 breeders and bred for them for 8 years, you would find yourself in the position of replacing an entire stock loft at one time. Continually replace the poorer performers with new candidates. If you employ a breeding strategy, this becomes a rule and standard of practice. Set a standard and create a system and follow it. You cannot reach your goals unless you have a plan to get there.

Creating "Sports"

Overview

I use the term "Sports" because it was a term used by M.H. "Dad" Paget in his book Intensive Line-breeding. In his term of sports it was used to define products of successful breeding. A Sport was a bird that was superior to the standard. I like the term because Champions are far and few between but most lofts have a few sports. Our goal in breeding is to create better birds with the genetic material

that we possess in our loft. Breeding means having a strategy and using that strategy to clean and purify our gene pool. By having a strategy and a system, we can eliminate deleterious genes and attempt to gather a greater concentration of positive genes in one single specimen. Yes, I really like the term "Sport". It defines what the goal of our hard work should be. I have loosely described the systems of in-breeding and line-breeding and crossing. I have written about strains and families of pigeons. But how do you put this all into practice? I have a system that incorporates both in-breeding, line-breeding and finally crossing birds from those lines to create hybrids that hopefully become sports. If these hybrids meet our potential, we can then begin to in-breed and line-breed from them. So this section will outline my system and how to implement it.

Purpose

As stated the purpose of the system is to use the tools of in-breeding and line-breeding reveal both deleterious and positive genes within our pool. This will allow us a better chance to eliminate bad genes and concentrate good genes in homozygous specimens. Whenever you line-breed and in-breed selection becomes paramount. Selection of the off spring and selection of the birds to place back into the line. With all the close breeding of various lines, it also calls for excellent record keeping and organization. I have a system in place for that as well. Understand that from one pair, you can be working on multiple lines after only a few generations in a fairly short period of time. Because we are working with very intensive breeding, we have to differentiate between the various lines. It's a scientific method of monitoring and cleansing a genetic line. Therefore we must be able to track each line and work them separately.

Record Keeping

It's a "no brainer" that you need to keep accurate breeding records. I'm not going to describe how to keep a breeding record in this section as this is not for the beginner. This is for the established fancier who wants to use these tools to improve their stock loft and its results. I use computers for my records. I used to use a program in which I would use the "strain" field to assist me in tracking lines. That field was free form and had a very good search system of records that allowed for "wild cards" when conducting a search. I could easily pull up a list of birds from certain lines and exclude pigeons that I no longer had with little problem. I eventually switched to Hawkeye Loft Manager. It was superior in some elements but I lost my free form entry and the ability to search my records as easily. Now I use the comments fields to make my annotations used for tracking breeding lines and generations.

Annotations

This section may not make perfect sense the first time through, but after you get deeper into this system, come back to this portion and then it will make perfect sense. An annotation is a way of writing in a comment section the line the bird is from and the generation it represents. You can be working multiple lines at the same time with various generations, so being able to track them is very important. Correct annotations also allow you to quickly find the birds you need to evaluate to incorporate back into the stock loft for a particular line.

An annotation often appears as such; 03487/34562/86/5a. The first five digits are the band number of the foundation sire in this line. The second five digits are the band number of the foundation dam in this line. The second two digits are the number of the specific line under this foundation pair. The last number and "a" notation are the generation of this specific line. This annotation system comes in handy once you have bread past a standard four generation pedigree.

Master Breeding Log

The master breeding log is where you will record what mating's have created each line. If you start a new mating that deviates rather than continue a line, or if you go back into earlier generations and create a new branch or line, it is recorded in the master breeding log. I will revisit this again towards the end of this section to reflect why we keep the master breeding log and how to properly record the breeding's of each line. This master breeding log is essential if you start to create multiple lines. One should never bank their success on one line and should have multiple lines if it appears progress is being made.

Intensive Breeding

This system allows for line-breed and in-breeding simultaneously from the same foundation pair. It makes it very effective as you can thoroughly explore a family genetically. Since we will have multiple lines working at the same time it is important to track your work with the annotation system. The intensive line-breeding method is the same as found in M.H. "Dad" Pagets book. I am not going to plagiarize his written work. I highly recommend it for reading; it is wonderfully written, very concise and often not seriously taken because it is not a huge volume of work. In his book he numbers generations. We will number ours as well, but it is necessary in tracking our work. The foundation cock is labeled as #1 and the foundation hen is labeled as #2a. Any hen in any generation is always labeled with an "a" at the end of her generation number. Line-bred generations are annotated with numbers and in-bred generations are labeled with letters. The in-bred generations are limited and using a letter instead of a number allows one to very quickly identify line-bred birds from in-bred birds.

In the first pairing of the #1 cock and the #2a hen we will produce a generations known as the #3/#3a generation. Essentially, it is a standard cross and most probably your foundation pair is unrelated so it would be referred to as a heterozygous cross. The #3 generation is then bred back to the parents to establish the #4X/#4Xa generation. This is the only generation labeled with both a number and a letter. The reason for this is generation is the generation where we differentiate into line-bred lines and in-bred lines. Here are the first pairings

Generation	Pairing		
Generation #1	#1 cock x #2a hen	#3/#3a generation	
Generation #2	#3 cock x #2a hen	#1 cock x #3a hen	Both will produce the #4X/#4Xa generation.
Generation #3	#1 cock x #4Xa hen	#4X cock x #4Xa hen	#4X will produce the #Y/Ya
Generation #4	#3 cock x #5a hen	#Y cock x #Ya hen	

Generation #5	#6 cock x #4Xa hen	#Z/Za generation	The #Z/Za generation is the end of the in-bred line. The #Z/Za generation is then used for crossing.
Generation #6	#7 cock x #5a hen		
Generation #7	#6 cock x #8a hen		
Generation #8	#7 cock x #9a hen		
Generation #9	#10 cock x #8a hen		
Generation #10	#11 cock x #9a hen		
Generation #11	#10 cock x #12a hen		

It looks confusing, but it's important to get the visual out there first before we can start to understand it. Two different things are going on in this illustration. We are breeding down from the original pair and starting an intense line-bred line, and we are also starting an in-bred line. We are using both strategies simultaneously. After the first generation a son is mated to his mother to start in the direction of line-breeding and a father is mated to his daughter to start in-breeding.

Line-breeding: The son x mother mating produces a 4X/4Xa generation. This 4Xa hen is then mated back to her grandfather the foundation cock or (#1) and from there the line is consistent. Each offspring is mated back to their grandparent. Each generation then is selected twice to the cock side then twice to the hen side. So what about #5, #6a, #7a, #8, #9, #10a, #11a, #12, et... they are excellent candidates to be used for crossings. You will need crossing from other foundation pairs to mate with the #Z/#Za generation from the in-bred lines.

This system allows you to systematically produce offspring for use in continuing you lines and offspring for crossing. The line-bred lines can continue for as long as they retain their vitality. The in-bred lines cannot make it past the #Z/Za generation before they will need to be crossed. As you get further down the in-breeding line, the harder and harder it is to produce a specimen that does not have deleterious genes or defects. Keep at it, and if you get 1 out of 10 or 12, that one specimen is invaluable for crossing.

Master Breeding Log and annotations

Whenever you start to cross a daughter back to a father or a son back to his mother, you enter them into the master breeder log and number the beginning of a line. So if you have sire #2394 and dam #9823 and you cross the son, #3432 back to his mother to begin towards line breeding the log would reflect:

02394/09823/01.3 with #3432 noted for this line. If later you were to take a different son out of this same pair and cross it back to its mother the annotation would be 02394/09823/02.3. With both of these the children's annotations would be the same as their #3 parent except the generation # would change as such 02394/09823/01.4X and 02394/09823/02.4X. I include the annotations in the remarks section of my database which is printed out on the pedigrees. The master breeding log is kept separate and maintained so that you have an accurate record of your line attempts. It's exceptionally helpful in creating your breeding strategy. Some lines may breed well only for few generations and then crossing

is necessary. When you take two of the 4X generations and cross them together towards in-breeding their entry into the master breeding log would look like this:

02394/09823/03 2394x9823 we'll use the band numbers of each part of the line in the log.

3432x9823

2120x2121 this is generation 4X and all their young will be annotated as 02394/09823/03.Y

If you took a different 4Xa hen out of the 3432x9823 mating and started to mate her with 2120 then you would make a new entry. We'll give her band # of 2145. The master breeding log would then have a new entry and it would be reflected:

02394/09823/04 2394x9823

3432x9823

2120x2145 this is generation 4X and all their young will be annotated as 02394/09823/04.Y

This way we don't have to differentiate in the log the difference between an in-bred line and a line-bred line. The annotation will reflect this difference in our records. We just need to keep track of how many lines we have or have attempted. Note any time a new bird is introduced into the line it needs to be reflected into the master breeder log. You could breed only 6 young from a line or you could breed 50 young. Their annotations will be identical. A new entry is only required when you bring one of the off spring back into the line to continue it.

By using this annotation system, when evaluating off spring you can very quickly identify that the young out of both lines are from inbred lines from the same foundation pair but that they are from different parents from that foundation pair. Genetically they are going to be very close, but the idea is to purify the gene pool. It's like having a funnel. The .03 line is one funnel and the .04 line is another funnel. You will not be taking youngsters out of the Y generation from the .03 line and mating them to the Y generation out of the .04 line. You are using very strict selection within each line. That way a line that has retained an unwanted gene can be discontinued. To cross lines unknowingly is to thwart your efforts towards very intensive line or in-breeding.

Ok, here is an example of the master breeder log, from the same foundation pair, except we'll use what would be the original line that was continued through 3432 and may have continued a few generations.

02394/09823/01 2394x9823 foundation mating

3432x9823 first cross back from the #3 generation

2394x2720 4Xa generation crossed back to her grandfather the foundation cock

3432x2823 #5a generation crossed back to her grandfather the #3 cock

3012x2720 using our guide chart this would be the #6 cock mated back to his grandmother the #4Xa hen.

4213x2823 using our guide chart this would be the #7 cock mated back to his grandmother the #5a hen.

This could continue indefinitely, anytime you introduce a new bird from the line that is not continuing the original line, you would make the entry and assign a new line number if it is a new bird from an earlier generation. So if you were to take a new hen from the #4Xa generation and place her with the #2394 cock, you would assign a new line number.

Now that we've discussed the log and the annotations it's time to discuss the theory and practice behind the breeding.

Intensive Breeding Theory

Overview

What is it that we want to accomplish when we breed? We want to produce prize and race winners. We want to produce birds that we can introduce back into the breeding loft that also produce prize winners and race winners. I don't think there is a competitive fancier that can disagree with this goal. If we can't do this ourselves our only option is to purchase breeders and hope they are producers, but what then? To continue on producing do we need to then purchase even more breeders a few years later also hoping they produce winners? No, our goal should be to produce those birds ourselves. What if it's not in my gene pool? We won't know this until we use scientific methods to sift through our gene pool to discover what is there and what is not. Only then can we actively introduce new blood and using those same tools, integrate better traits into our family. This section covers the theory and practice of intensive breeding, more precisely intensive in-breeding. Also here is described line breeding which in reality is another form of in-breeding.

Process

The process is simple. Using in-breeding and line-breeding, we will take foundation pairs and refine their collective gene pool by producing off spring and using strict selection, continue intensive in-breeding and line-breeding to further refine the genetic material. Using this process we will produce several lines from several foundation pairs. At a certain stage, two unrelated lines are crossed with the hopes that the genetic material when combined in the first generation of offspring will produce birds that are superior to either line.

1. Two pronged approach to intensive breeding. The reason both line-breeding and in-breeding is used in this system is that both can be done simultaneously.
 - a) **Intensive Line-breeding:** Line-breeding is done with the intention that it can be continued indefinitely as long as the line maintains its vitality and genetic refining does not run into a dead end. It reveals deleterious gene combinations in a slower rate than intensive in-breeding. It allows for the production of both specimens to continue a line as well as

- specimens intended for crossing. The methodology is simple and does not require complicated schemes to maintain. There are some line-breeding methods that are so complicated that almost no racing fancier could maintain birds for the system unless they simply did not race the offspring. In this system, we want to race the offspring as the training basket and the racing crate are part of the selection process.
- b) **Intensive In-breeding:** In-breeding will bring deleterious genetic combinations to the surface at a much more rapid pace than line-breeding. It will dead end more often and requires more attempts to find just the right in-bred line that will produce a generation (The Z generation) that is most homozygous for selected traits and will give the best results when crossed with another unrelated line.
2. **Crossing lines:** There is a term called "Hybrid Vigor". This is when two unrelated lines or families or strains are combined producing a hybrid that is a superior performer to either line. Unfortunately, in most cases these hybrids do not produce well. If we understand genetics, the reason they do not produce well is because they produce offspring which are very heterozygous. If you are paying attention, that is the "ah ha" moment. Hybrids are performers but not producers. So what is a producer then? A producer is a homozygous specimen such as is the result from intensive in-breeding and line-breeding. That's it in a nut shell. We are using a breeding strategy to take heterozygous breeding stock, refine it into nearly homozygous producers and breeding stock so that we can then cross them and get hybrids that are superior performers. We are going to take the "Z" generation of the in-bred lines and the selected generations from the line-bred lines and cross them together to attempt to produce "sports". This is the end result that we are seeking with this system.
3. **Perpetual Breeding:** It doesn't stop with the hybrids we produce. Consider those hybrids as heterozygous stock that again, can be mated, off spring selected and using both in-breeding and line-breeding once again lines can be established and crossed. This is even better than the original breeding stock as you are starting again with heterozygous birds, but they are of heterozygous material that you already refined through the breeding strategy and process to eliminate deleterious genetic combinations. Your progress is continuing and hopefully there will be even less original flaws and going through the process again, instead it is a matter of shifting through genetic variation to keep what is best and eliminate or limit what is not. This system is PERPETUAL. Some lines will genetically dead end. Some lines will be successful. That is why this system takes work and a systematic process.

Refining Continued

1. We need to have "perfect" foundation birds! False. Show me a perfect pigeon! We have so many various types of races and conditions that there is not one standard of bird that performs equally in all races. There are so many traits in pigeons that have a direct impact on racing that we can't see or hold or observe. We have to ensure that the training basket and race crate are

part of the selection process. Then after both of those have their say in the matter, we will use our own strict selection to incorporate candidates into the breeding loft to continue our lines both in-bred and line-bred. Sometimes we will find success and it is a GUARANTEE many times it will result in failure. We are not looking for instant success as there is no such thing. We are looking at trial and error to find those "gems" of mating's that will propel our family forward. We are looking to refine our genetic material and "breed up".

2. We need a lot of birds to utilize this system. False. This system could be started with only four foundation breeders. It's better to begin with 6-8 breeders. We have to work within our means and every fancier has a different level of means for breeding. Regardless of how many foundation pairs and lines you are working, you need to have good record keeping and a system to keep your mating's and progress straight. It's best to have four unrelated lines, but as little as three will work. Having up to six lines will make it more probable that if a line dead ends you will not have interrupted work.
3. In-breeding is going to produce inferior pigeons. Absolutely!!! You better be prepared to produce inferior pigeons. Even if you have never in-bred before, show me a fancier that has NOT produced inferior pigeons with whatever breeders they have. Through genetic variation, there are offspring that differ from one another, some are better, some are worse. Why in the world would you cringe at the thought of in-breeding when you already produce inferior pigeons that are culled by the training basket and race crate with your current methods? This system is the same. The only difference is that we are trying to produce higher quality birds on the other end of the scale. Which is better? 5 of 12 offspring that are of above average quality and 7 that are not, OR, 2 of 12 of superior quality, 4 of mediocre quality and 6 totally inferior quality birds. I'm not a rocket scientist but I'll take 2 Superior pigeons to 5 above average birds any day.

Intensive Inbreeding “A Practical Discussion”

When we discuss breeding, we are not discussing simply how to put two birds together and get offspring. We are discussing how to breed to a higher standard to get the most potential out of our stock. When we start discussing genes and how they work and strategies things get complicated and it's pretty easy to get lost in the discussion and the research and lose touch with the nuts and bolts of how things work. This is an attempt to bring that discussion to the kitchen table.

For simplicity sake, let's assume you have a great performing pigeon and we'll use an old term of "sport". He or she may not have been bred out of birds that themselves were the most outstanding pigeons. Reality is that your new sport is only going to perform for you for 5 or 6 years at the most. You look at him or her and you think, "I would love to have 12 of him or her in my loft and I would be on top of the world!" Any fancier in their right mind would have the same thought.

So you put your sport together with a hen that is proven and you don't produce anything close to your

treasured sport. Now what do you do? At this point, fanciers then start to for the first time to consider things like inbreeding and line breeding in hopes that this may be the way to get a copy of their sport. Now we are starting to walk down the right road. We have a true goal in mind. We are stepping beyond the idea of mating the best to the best, regardless of pedigree for a goal of producing a specific type of pigeon. This is where the strategies of line breeding and inbreeding begin.

It's easy to get confused when all of a sudden diagrams are in front of us showing the specific mating's and re-matings of birds required for line breeding and inbreeding. Then you throw into the mix ways of labeling or recording these mating's and before you know it, confusion starts to set in the and the basic principal is lost. That is not the intent of the material. That is why I have decided to write this discussion.

Let's start with our treasured sport. When we look at him, we are looking at the physical manifestation of everything his genetics determined he would become. We already know that there are physical traits that we can see and measure. These are the things in our comfort zone. We also accept that there are qualities about him that we can't see but have been tested by the basket in training and the races that he has competed. This is also in our comfort zone. Now we have to accept that there are genetics he possesses that were not physically manifested. There are genes that may be superior to what he has become and genes that are negative and undesirable. Both of these types of genes can be passed on to his offspring. The same statement also applies to any mate that you choose for your sport.

Now we have accepted a very important truth. Our sport, regardless of how phenomenal he may be, could genetically poses traits that are undesirable but not physically manifested. Only after we have accepted this truth can we begin our journey towards producing another sport. We have also accepted that there are traits that he has manifested that we cannot see and he possesses traits that not only are not manifested, but can be passed down to his off spring.

Now the journey can begin. We talk about gene pools. Mostly we discuss them in the larger scheme. You can consider all the genetics possibilities in your breeding loft as one large gene pool. If you have 12 breeders, every bit of genetic material in their chromosomes is part of your gene pool. But, for inbreeding we have to narrow down this thought to truly get our minds around it. Our gene pool is the genetic material possessed by our one sport.

Every time he is mated 50% of this genetic material is passed own to his offspring (1st generation). If his off spring is mated to an unrelated pigeon, our 2nd generation now only receives 25% of our sports genetic material. The math is easy, within a few generations we are not looking genetically to anything close to our sport.

This is where inbreeding then becomes the tool of choice. By inbreeding we are attempting to increase the amount of genetic material possessed by the offspring from the foundation birds. I use the plural form because our sport cannot produce off spring without a mate, so we will always have two foundation birds. In the chapters on inbreeding and line breeding the diagrams always start with a #1

cock and a #2a hen, our foundation pair.

The reason that my strategies involve working with the descendants to start the inbreeding program starts with the two foundation birds and not the ancestors is because most people do not have all the ancestors. We are living in an age when so many birds are purchased from pigeon brokers for a great deal of money. Often, birds in the pedigrees are not flown, they are “bred for stock”. In other words, they may be physically appealing, but they were not tested by the basket or the races. They were kept and maintained to produce offspring for sale. We do not want “bred for stock” in our program. We want tested pigeons. The only place you are going to find tested pigeons, in the conditions you are competing, is in your own race loft.

If you have the ancestors of your sport, and they have been tested, you are a step ahead on the theory. Consider that your sport is 50% of his sire and 50% of his dam. Somewhere in that mix, he received the right combination to become a sport. In that mathematical equation, that scientific dance of the chromosomes, he got “the right” combination. In theory, his siblings can be very much genetically the same as he, or genetically, almost unrelated. Let’s assume that a sibling is also 50% of the sire and 50% of the dam, but they were the opposite 50%. Genetically, they would be very much different than our sport. This is why once we have a sport; we want to start our breeding program descending downwards, instead of fighting upwards.

If you mate your sport to his daughter, she is 50% of him. Their offspring will be receiving 25% of him from the daughter, 50% of him from the sport and 25% of the genetic material from the daughter’s dam. That’s a 75% to 25% ratio. You cannot be guaranteed to get that much concentration even when you start to mate back up the pedigree from your sport. Granted your chances are greater than mating to unrelated pigeons, but why bother going up when you can go downwards and control what you are producing?

We accepted the truth that our sport and all birds have manifested physical traits (genetic material) that we can see and feel. They have manifested traits (genetic material) that can be tested by the basket and the races. They have traits that were not physically manifested that cannot be seen nor can be tested, but surely, can be passed to the offspring.

This is our task then towards producing our sport. We have to use the tools of inbreeding to sift out, those undesirable traits when they are manifested. We want to concentrate the genetic material that produced our original sport. We want to create offspring that are as close as possible to our original sport. If this is what you want to do, then follow the intensive breeding program.

When our brother fanciers in the colored fancy pigeons want to know what genetics are behind a pigeon, they inbreed downwards and isolate the various genetic alleles. They let them reveal themselves and then they know what combination of genetics is responsible. They also know what genetic traits were possessed but were recessive and not expressed. This is EXACTLY what we are trying to do with racing pigeons. We are trying to reproduce the expressed genetics of our original sport

which we cannot see or feel.

That is why the intensive inbreeding program was written this way. To save you time mating back up into the pedigree. To go “intense” and quickly shake out the genetic material that is undesirable. It is designed to quickly isolate, and “double up” or create homozygous material that is desirable. It is designed so that the results of your hard work can be reproduced. You must accept that there is no magic pill or magic formula. You must accept that you will produce inferior birds. Early, the ratio of desirable birds may become as great as 1:10 or even greater. You must accept that some lines will dead end, and you must go back and breed downward again. Trudge onward with faith in the theory and it will pay off.

The Importance of Record Keeping

Record keeping is extremely important in race pigeons. Normally, when one thinks of record keeping they think of the basic pedigree. Record keeping goes beyond a pedigree. Accurate record keeping allows you to establish a compilation of data. This data can then be analyzed to discover new things. Decisions can then be made based on data and not on theories or guesses. Here are examples of necessary or desired record keeping.

Breeding Records:

Breeding records are one of the most important records you will keep. Breeding records though when supplemented with other good record keeping skills can enhance a pedigree with accuracy. This is the basic information that you should record in regards to breeding records.

1. Sire and Dam
2. round number
3. date eggs are laid
4. date eggs hatch
5. date youngsters are banded
6. band numbers of youngsters
7. date youngsters are weaned
8. Physical observations about each youngster, short down, uncommon naval, slow development, etc.
9. color of youngster

Racing Records:

If you have a program such as Hawkeye Loft Management system by Comproware, then keeping accurate race records is easy and analyzing data is much easier. The following should be recorded in the race record for each bird. Using this data you may discover that a certain bird scored in a certain nest condition. This would allow you to set up the bird into the same nesting condition for the same distance on another race or the following season. You may discover that your birds score in certain weather conditions but not others. The performance is important to also add to the pedigree. If your

bird is a prize, diploma or race winner, be sure to update that on the record of the Sire, Dam, Grand Sires and Grand Dams. You can also go one step further and update the records of the Great Grand's, but this can lead to a lot of work.

1. race date
2. race distance
3. Race conditions, weather, wind, temp etc.
4. release time
5. arrival time
6. speed
7. loft position
8. club position
9. federation position
10. combine position
11. points earned
12. diplomas won
13. race winner
14. winning speed
15. Nesting condition
 1. celibacy
 2. widowhood cock
 3. widowhood hen
 4. natural system
 - a. unmated
 - b. cock driving hen
 - c. driven hen
 - d. sitting on eggs 1-6 days old
 - e. sitting on eggs 7-12 days old
 - f. sitting on eggs 13-18 days old
 - g. eggs pipping
 - h. youngsters 1-7 days old
 - i. youngsters 8-14 days
 - j. youngsters 15-21 days
 - k. youngsters 21-28 days old
 - l. on eggs, mate removed
 - m. race bird removed 1-2 days before shipping
 - n. jealousy used
16. return condition
17. position in the moult
18. notations of physical condition when shipping (will help you establish what are the signs of form in your loft)

Season Records:

The things you do during the race season also need to be recorded. If you have a successful year, you may want to duplicate your actions, but if you do not record them, it's next to impossible to duplicate them the following year. This is especially true if you are always changing the way you do things. Here are some of the notations that are important.

1. date of medications and vaccines administered
2. type of feeding each day
3. Type of training or exercise given to the birds, weather it is loft flying, flag flying, road training etc.
4. Dates major events happened such as pairing up for natural, splitting cocks and hens for widowhood etc.
5. Preparations for shipping
 1. time birds were fed
 2. what you fed them
 3. if you took grit away
 4. what time you put hens/cocks together for widowhood
 5. when you crated before going to the club
6. Weather conditions

Conclusion

You can have records of whatever is important to you. The fancier who keeps consistent and accurate records is ten steps ahead of the fancier who does not. Record your data, don't throw it away. Put your season records in a binder. You never know when you will want to go back, look at what you have done, or duplicate it. Sometimes we try new things and decide it wasn't a move forward. Record your data. Be diligent and you will have the power of information in your hand.

Fostering

I was half tempted to entitle this section "Embryo Transfer". In horses, embryo transfer is the procedure of artificially inseminating a mare from sperm from a specific stallion. Once the mare is pregnant, the embryo is then surgically removed and transferred to the womb of a surrogate mare. Pretty complicated, very scientific and extremely costly. When we talk about fostering, it's the same thing, except without the surgery, the cost and the need for veterinary personnel.

When one plans on fostering, or moving eggs or youngsters to a foster pair, one has to take care to put the foster pair into nearly the same laying cycle. Why is this important when we are talking about eggs and not embryos? It is important because the most important food source for a newly hatched chick is pigeon milk. Pigeon milk is a substance developed in the crop of parenting pigeons. This is regurgitated and fed to the chicks. Later the chicks will develop enough that you will notice the parents will pass direct feed and grit to the youngsters. This can be seen in the almost transparent crops the squabs. It is best to ensure the foster pair selected is on the same if not no more than 3-4 days ahead of

the egg laying pair.

Fostering gives you the ability to produce more than one round of eggs from a foundation pair. In some sources, fostering parents are referred to as “pumpers”. The term “pumpers” was probably adopted because essentially the foster pair is pumping the youngsters with pigeon milk and feed but not the biological parents of the youngsters. In the natural system, often a fancier will move youngsters to another pair that might have only one youngster and let them foster in the parents absence.

What to consider in foster parents or “Pumpers”

We often talk about what to look for and evaluate when selecting race birds and breeders. If you plan on using a system where your race birds will raise a round, consider making them pumpers of eggs from the breeding loft. Take notes on the nesting behaviors of your race birds. Birds that feed their youngsters extremely well and stay tight on the nest are excellent behaviors to note. Birds that stay put when you attempt to inspect eggs or youngsters are desirable. Birds that flee when you intrude into their nest should not be considered as pumpers.

If you have space and want to keep pumpers for the sole purpose of raising futurity youngsters, these notations will assist you in choosing birds from the race loft to become pumpers. Pumpers should be between the ages of 2-6 years old. Do not use overly aged pigeons as pumpers. Raising a youngster is stressful and taxing on a pigeon. Your goal is to give a youngster the best possible start as possible. If this is our goal, we should not use overly aged birds as pumpers.

Never use a pumper that has ever contracted canker. There are various strains of canker and the immunity to canker is passed down through pigeon milk. A loft with perfectly healthy pigeons can be exposed to a strain of canker that the loft is not immune to simply by adding stock that is a carrier for a different strain. This is the other reason to use pumpers between 2-6 years old. Their immune systems are performing at a higher level and this will be better for the youngsters.

Summary

By adding fosters or pumpers to your program, you can increase your ability to produce very healthy youngsters to the numbers that you desire out of a small amount of stock birds. Ensure that you are recording nesting behaviors and rearing abilities of your race birds so that you can make good selections from those that do not go to the stock loft to instead add them to the pumper loft. Always use pumpers between the ages of 2-6 years old that have not shown signs of sickness and especially canker. Ensure that you keep the laying cycle between your breeders and your pumpers the same so that the newly hatched chicks have adequate pigeon milk.

Genetics; Chromosomes and Genes

Chromosomes

The biological vessel (pigeon or any other plant or animal) is broken down into cells. Each cell contains chromosome pairs composed of DNA (Deoxyribonucleic Acid). The DNA protein coding on each

chromosome can be broken down into small identifiable sections referred to as genes. Pigeons have 40 chromosome pairs.

Chromosomes reproduce themselves in two different ways. The first way is a process called mitosis. This is a process necessary for a cell to double itself. When a pigeon lays an egg, inside is the first cell containing the chromosome which through mitosis will become a pigeon. That first chromosome will double itself countless times until an embryo is developed. This process will continue through growth and far into the life of the pigeon as just like humans, a pigeon is continually reproducing cells to replace damaged or old cells.

The second way chromosomes reproduce themselves is a process called Meiosis. This is the process where chromosome pairs divide and 1 of every pair is transferred to a gamete. A gamete is a sex cell which contains 1/2 of the chromosomes of the parent cell. In reproduction, a child receives one gamete from each parent.

When these two gametes come together during procreation a new chromosome is formed unique from each of the parent's chromosomes.

Sex Chromosomes

Of the 40 chromosomes in pigeons one is known as the sex chromosome. In humans, we call this the "Y" chromosome and it is carried by the male. In pigeons we call this the "W" chromosome and it is carried by the female. The sex chromosome carries little known information but determines sex. If a gamete receives the sex chromosome then it will produce a hen. The other chromosome of the pair that the sex chromosome is a member contains genetic information. When a characteristic is called sex linked it means it is carried on this chromosome (the one in the pair opposite the sex chromosome). In a hen, who has the sex chromosome she will only receive one gene. For cocks, they do not have the chromosome, they will receive two. Here is an example using the color gene since it is sex linked. B represents the color Black/Blue

Cock (B/B)	B /B	B/B
Hen (B/"W")	B/"W"	B/"W"

All gametes with "W" are hens with only one color gene. All cocks have two color genes instead of the sex chromosome. For recessive genes on the chromosome it simply means a cock must inherit the gene on both chromosomes before the gene is expressed. This is in such cases as dilute. For a hen, she only needs one recessive gene on the chromosome opposite the sex chromosome in the chromosome pair. This leads to the saying "A hen simply is what she is." Not necessarily true in genes that are not located on the sex chromosome.

Genes

Genes are DNA coding on a particular location on any chromosome which have been identified has having a hereditary effect that can be observed. For our purposes, these are traits that can be seen. In the purest sense, this would also apply to such things a cycle cell anemia, blood type, hemophilia etc. in

humans. In pigeon breeding this would apply to feather coloration, feather quality, eye color, body type etc. There are probably thousands of traits that cannot be observed in the hand but have a direct effect on racing. Lung capacity or efficiency, heart strength, muscular processes etc. The possibilities are endless.

Often more than one gene can affect a certain trait. For coloration for example there are genes for basic coloration and yet there are other genes (located on a different location of a chromosome or a different chromosome altogether) which may also have an effect on a trait. An example of this would be basic color in combination with the gene (self or spread). A black/blue pigeon becomes solid black, a Red/ash pigeon becomes a true silver and a Brown/Khaki pigeon becomes a solid brown or sometimes called a dun.

The Gene Pool

Chromosomes and Genes

My intention is not to make this too complicated. In simplest terms, every pigeon, in every cell has chromosomes which carry genes. Chromosomes come in matched pairs, except for Sex Chromosomes in which the sex chromosome carries very little genetic information. On all chromosomes except the sex chromosome, there are two genes, one on each chromosome of a pair. The dominant gene expresses itself while the recessive gene does not. On the chromosome matched with the sex chromosome, the gene opposite the sex chromosome it always expressed. Since hens carry the sex chromosome in pigeons, recessive genes on the opposite chromosome in the pair will be expressed. Both genes have an equal chance of being passed onto the next generation.

More than one gene can affect a trait. Some genes, though recessive, can mask other genes. (Example recessive red is located on a loci other than color or pattern and when expressed, mask both). The expressed genes form a phenotype. The phenotype is what we see when we look at a pigeon. The full chromosomes, genes both dominant and recessive form what we call the genotype. Some genotypes can be explored by close observation of the 2nd generation and selective mating to wild type.

Gene Pool

The gene pool in a family of birds consists of all the genes of the genotype of every breeder within the family or loft. There may be genes that have not yet been in the proper combination to express themselves and may be undetected. The gene pool thus consists of all genes beneficial and deleterious. If a gene pool remains contained without outside contamination (example the introduction of a new breeder with ancestors not descending from the original gene pool) the only change in the gene pool would result from mutation of an existing gene or a new combination of genes which express themselves differently than before. Variation would still exist within the confines of the gene pool. Genes could be eliminated by careful selection. Dominant genes that express themselves could easily be eliminated. For example, eliminate all red/ash colored birds and they will be totally absent from the gene pool. Elimination of recessive genes is very difficult since they can be passed on for many

generations before being expressed.

Steps to Developing, Maintaining and Improving a Gene Pool

This is literally the million dollar question. How can I improve my gene pool to produce winners year after year? There is no doubt that outstanding breeders can be purchased that will produce outstanding and superior pigeons. The question is can you continue to add to the breeder loft from the race team and continue the same excellence. Unfortunately for some fanciers, this is not the case and they end up falling into mediocrity and eventually cleaning house, buying new stock and starting over. For others it may seem that they are staying in one place, not quite moving ahead, but not really falling into mediocrity.

Gene Pool -- Two modes; Static and Dynamic

The gene pool is either in one of the two states of activity. Static means the gene pool is constant with no foreign introductions. In other words no birds are being introduced that are not descended from the present breeders and those descendants do not have ancestors from outside the breeding loft gene pool. This could also be described as a captured gene pool. Dynamic is the opposite. It means new breeders are being introduced each with a new set of genetics or descendants from the present loft that also have ancestors from outside the gene pool are being introduced back into the breeding program. Developing a family requires a gene pool to be both static and dynamic. Knowing when to be static and when to be dynamic and the proper methods of being dynamic is what leads to success.

Step 1: Isolate the Gene Pool

You must first decide exactly what your gene pool is. If you really analyze pedigrees you will soon learn that there are true foundation birds and then there are other birds that are descended from or related to foundation birds but also have ancestors completely not related to the foundation birds. There might be 1/2 brothers and 1/2 sisters that carry related genetic material but also unrelated genetic material. It's so easy to have a sport and when looking at our current breeding stock saying to ourselves, "This bird is related and has 50% of my champion's genetics. I'm going to keep it and see if I can produce something good." Why risk it? Why invest the time and space in this 1/2 related bird? You already have the champion, which is all you need to develop. We often develop an attachment and hope that the related genetics can be used to improve our birds and breeding stock but don't take into account the variables from the unrelated genetic material. This can be such an easy oversight. It is better to keep the foundation birds, let go of related birds that have ancestors unrelated that not much is known or in reality wasn't really tested in our loft or worse yet, was tested and failed yet this one related bird managed to be above average or even good, but not great. Once we can get past this hurdle we can start to redevelop around foundation birds. This is done with one or two methods; intensive line-breeding and intensive in-breeding. These two techniques can only be done when one has captured or isolate the gene pool.

Step 2: Refine the Gene Pool

With intensive line-breeding and intensive in-breeding, what we are really doing is taking our now captured or static gene pool and trying to "double up" genetic material. The purpose is to create as

much homozygosity as possible. In very simple terms, any recessive trait will not be expressed unless other dominant traits do not exist on the corresponding chromosome and location. If you are familiar with recessive reds then this is a great example. Mate a recessive red to a blue check and you will probably get blue checks and blue bars but not recessive reds. Those youngsters will carry the gene for recessive red but it will not be expressed unless the bird has two recessive red genes (one on the same location on both chromosomes). At this point, we don't know if any recessive genes in this gene pool are beneficial or negative. There may even be traits that we have not seen expressed. Our goal is not to eliminate every single negative gene for that would be an impossible goal. But by creating homozygosity, or as much of it as possible, we are able to take steps to keep what is beneficial and eliminate what is not. We are looking for what I dub as "10%'ers". We are looking for young that physically meet our own specifications (each fancier has his own), and through testing by training or better yet racing we can eliminate birds that do not have the internal or intangible traits and identify birds that do possess them. Out of these tested youngsters, we are looking for the top 10%. Once we have identified them, they are brought back into the breeding loft to be worked into either a line-breeding or in-breeding method to continue to refine the genetic material again.

Step 3: Manipulate or Recombine the Gene Pool

This is where crossing comes into play. When we talk about crossing we are not talking about crossing unrelated birds from outside the gene pool but are talking about crossing different lines within our gene pool. For instance the 5th or 6th generation under a line breeding method may be crossed with a 4th generation youngster under an in-breeding method each from two different foundation birds. Each of these youngsters have gone through a few generations of refining and proven that the traits they retained were beneficial and they possessed at least in homozygous stated any negative traits. Now by putting them together and crossing them, we are looking at shifting the refined genetics around in the offspring creating variation, and hopefully producing some 10%'ers that have the most of the best from both lines. These are what we could call our hybrids. From these 10%'ers that prove they can score or meet our standards, if introduced back into the stock loft must go through the process of starting another line with either line-breeding or in-breeding and the process continues again and again.

Step 4: Improving the Gene Pool

This is one of the most critical steps and the easiest to make mistakes. When we have a static gene pool that has been properly isolated, manipulated and recombined, we are in the position to actually be able to introduce improvements. There is only one right way to accomplish this task. First we have to avoid contamination. There are studies which prove and also observant breeders with good observation that can tell you and show you that illegitimacy can happen in any loft. If breeders are not isolated into individual breeding cages, illegitimacy can and does happen. If you have an isolated gene pool, this may throw off developing lines, but it will not destroy, alter or hamper the gene pool. If however we introduce new stock, any illegitimacy will completely contaminate the gene pool and all your hard work is hampered. When one wants to introduce new stock they must be isolated from your static gene pool. Youngsters must be bred from them and tested in the racing loft. If they meet the standards, line breeding or in-breeding methods can be used to once again, refine this new gene pool. Once those lines are established and refined, and the birds still meet standards, these later generations

can be introduced into the main gene pool for breeding and will become part of your new static gene pool. At the time of the new introduction you can consider your gene pool to be dynamic. If the new stock dead ends or deleterious genetics are discovered, you can safely eliminate them and search for other more suitable stock to test without having contaminated your gene pool.

Gene Pool Lag

We've discussed isolating a gene pool and how isolating new stock until it has been tested, gone through its own refining process and if tested true, been introduced will help us avoid contaminating the gene pool. What we have not discussed is what I call "Gene Pool Lag". For those that race young birds, this is usually not an issue. For those that race old birds, weather natural or widowhood, this is another obstacle and pitfall. Have you ever raced youngsters that made the distance, or had a young bird team that was almost decimated due to a super tough season? Have you then kept them, knowing that great long distance birds don't necessarily make great spring or middle distance pigeons? You held onto these birds to continue to work them out and see what they can do. There is absolutely nothing wrong with this, it is exactly what most flyers do. BUT, what most fanciers do is the breed one round or more out of old birds on the natural system or maybe even one round at the beginning or towards the end of widowhood. These youngsters are then placed on the young bird team, or kept and trained to race the following year as yearlings. If you took these birds and analyzed pedigrees in most lofts you would recognize a cycle. You would see that some of these birds have a parent which did well as a young bird, maybe did ok as a yearling and then got lost. You might find that several or many have ancestors that were race birds that may have even won diplomas or race wins, but for one reason or another eventually were gone. These young birds even if they turned out to be "sports" could not be mated back to their ancestors to give you a jump start on continuing or developing a line. Worse yet, they may just meet the standards, but they will most likely continue the cycle of also producing maybe above average, but not great youngsters that will continue yet another generation in your loft wasting space, time and money.

How do you avoid this? Simple, if the breeding program is where you are refining your genetic material and attempting to improve your gene pool, that is the only place where this effort should stay. You should not produce youngsters out of race birds. You should only be flying widowhood on eggs that are brooded but not hatched or some form of celibacy. By doing this you will not allow yourself to fall into Gene Pool Lag and you will also not be tempted to keep birds that eventually will disappoint you or only last a season or two.

