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Introduction

Firstly I would like to thank you for this purchase and also just give a quick run down of what to expect from this product. My aims are to give you a full but simple analysis of many aspects regarding nutrition for your racing pigeons. I will cover the essentials, where they can be found and what they are used for, I will cover the does and do nots of nutrition, I will cover a great many foods that can be used to get the maximum potential out of your birds, and also we will take a look at what food mixes will get the best results depending on certain variables such as weather and race distance.

Now this all sounds very general but you can relax, everything will be very encompassing but also very easy to digest.

Energy Overview

Knowledge regarding the nutrition of pigeons is advancing every year. Thirty years ago, when I started racing, it was not unusual for many fanciers to just feed peas and wheat. It now seems incredible to us that fanciers would think that a diet made up of one, two or even three seeds would provide a complete diet. We now know that it is virtually impossible to supply all of the nutrients that pigeons require if fed only a dry seed diet, even if the variety of grains given is quite large.

Poor nutrition will suppress the birds’ ability to resist disease, compromise growth, prolong recovery from exertion or illness and decrease reproductive performance. However, it should be remembered that what the astute fancier is aiming for is not simply to avoid any obvious health problem but rather he wants the best diet possible so that his birds are at their best competitively.

So, firstly we need to get familiar with the one underlying factor in racing – energy. We need to find out what energy sources will gain the maximum from our birds, you need to consider how pigeons function, what energy systems are used and how to get the best nutrition balance to supply energy for the race duration(and trip home!)
Now in general every organism above plants and algae, need to gain energy from food. To fully exploit this energy for pigeons a fancier almost has to become a feeding expert.

We can only begin the art of good feeding when both the quality of the food is guaranteed and the flock is healthy. A healthy bowel is required before we can test our feeding systems, because an unhealthy bowel fails to deliver the fuel of good grain to the pigeon’s body. Bowel diseases such as E.coli, coccidiosis, worms and wet canker all decrease the amount of nutrients entering the body.

By using the best quality grains and with a healthy race team, the fancier can now think about a racing mix appropriate for his particular family of birds and training methods. The mix chosen must provide a good balance of protein (amino acids) and for this to be achieved at least 8 different grains must be used (though there are other sources of good quality amino acids we will cover later on). After this balance is achieved, the energy content of the mix becomes the most important part of successful feeding.

Of course, the fuel requirements of the training pigeon vary enormously from day to day. It is the constantly changing energy requirements of the competition pigeon that makes feeding such a challenge to even the best fanciers. The competition pigeon will not perform to its fitness level when the “energy balance” is incorrect. The “energy balance” must be assessed short term (daily) and long term (weekly) with fit flocks during the race season, because the fitness level will drop both when too much and too little energy is supplied. During young bird training special attention must be made to prevent depletion of the energy reserves in the liver and muscle.

Overfeeding relative to workload (positive energy balance) renders the race team less competitive because of excess baggage (“leady”). Excess energy is stored as fat with subsequent loss of buoyancy and fitness. It is well to remember that the excess energy of mixes which are too high in protein (legumes) relative to the work load will be stored as fat.

Under feeding relative to workload (negative energy balance) renders the race team less competitive because of “depowering”. Feed systems low in energy relative to the workload of the race team will result in the depletion of the energy reserves in the liver, fat and muscle. The fancier can recognise a race team that is in a negative energy balance by the following signs:
No wing flapping in the early morning or after feeding.
Disinterest in leaving loft or toss basket, lower lid laziness etc.
The race team in negative energy balance (inadequate energy intake relative to the workload) is susceptible to illness, especially “respiratory” diseases.

We should now take a little look at the term “buoyancy”, most fanciers should be familiar with it but this is just for those that are not; Buoyancy is trying to give your birds a weightless feel when you hold them. Buoyancy is best achieved by supplying the flock with enough feed (a positive energy balance) to promote vigorous loft flying (or tossing) in order to maximise lean body mass (i.e. muscle) and minimise body fat. Instead many fanciers believe that the best path to buoyancy is to restrict caloric (energy) intake (feed less) in order to lose excess weight and thereby produce the buoyancy that we see with top form. However, buoyancy is not only weightlessness, but also power, and the buoyancy of fitness only comes when lean body mass is maximised. The restriction of calories in an effort to produce buoyancy in fact lowers the fitness level of the flock and renders it susceptible to illness. Severe caloric restriction will cause a loss of not only body fat but also lean body mass (muscle) with the accompanying loss of fitness and power.

Now lets take a look into how pigeons function, we need to know how pigeons deal with different nutrition, for example tests have been conducted to show that a pigeon will burn up its carbohydrates(mono/di/poly-saccharides) within about 10 minutes. These obviously have to be taken into account with nutrition, if a product will be burnt up this quick then should it be a large proportion of the diet?

When these carbohydrates are depleted then the energy system switches to fats in the blood for about the next hour, this lets you know that you should feed your pigeons a fatty acid diet at a long enough time before hand for them to be accessible in the blood.

And after the fatty acids in the blood are all out the pigeon must then rely on the fat reserves stored in its red muscle fibre. By knowing approximately how much fat is used per hour of flight we can then try to optimise our pigeon to have enough fat for the rest of the flight and the trip home.
Now finally if all reserves of fat are depleted the pigeons body will start to break down muscle fibres into amino acids that it can then use for fuel. Now this is definitely not what you want, this will start to damage the pigeons muscles and organs as its body disassembles itself for energy. As you may guess this carries great consequence, pigeons are often permanently “damaged” and cannot reach their previous standards.

So as you can see just from this snippet of information there is a lot to take into account regarding just how the pigeons energy systems rely on nutrition.

Now a quick look over some of the energy systems used, they generally fall into two main groups;

**Anaerobic**
The anaerobic system is the energy system that does not use oxygen for its energy and is a relatively short term energy solution the body has developed for quick speed and power. This systems bi-products though can be harmful, namely lactic acid. This acid will build up via your anaerobic respiration system and weaken your muscles. Later on we will take the time to look at different nutrition that will help our birds deal with this lactic acid build up to help prevent cramps and muscle degradation.

**Aerobic**
Aerobic is the long term energy system that makes use of oxygen, this is obviously supplied by breathing, but still factors have to be considered and addressed to try and get the best performance out of your pigeons system such as nutrients that help to increase red blood cell count or oxygen reception etc.

There are basically 3 different seasons to the racing pigeon and each stage requires a different diet and feeding regime for your pigeons which you have to be fully aware of if you are to acquire any success in the sport.

Now different nutrition becomes very important and will vary by a few important factors, the birds age, the season and the weather.

To cover seasons there are three that you as a pigeon fancier need to be aware
of; the breeding season, the moulting season and the training/racing season. Nutritional balance will alter depending on which season your birds are currently in. The various dietary components will need to be tailored to the season correctly to gain the best advantage for your birds when they eventually come to race.

I mean you can just buy a bag of food from suppliers for each different season/age/sex etc. but I am here to give you a real insight into what is needed without the sales marketing of those companies telling you what is needed. Don't get me wrong most of the dietary elements can be obtained from these mixtures but you need to know when to add certain minerals or when certain portions are not necessary or even detrimental to your birds performance. Its just mastering when and how much of these specific elements you feed your pigeons that can be the difference between winning and loosing a race.

It is also wise for fanciers to understand in reasonable detail how their birds work, both nutritionally and anatomically.

**The Anatomy of the Pigeon**

As increasing amounts of literature about pigeons become available, it follows that there are many more informed fanciers than ever before. In terms of diets for racing. For example, many fanciers are becoming more aware that the flight muscles of pigeons need the cereal grains such as wheat, oats, barley, corn, etc. and not, as many British believed for so many years, the legumes such as peas and beans, as the major fuel: however, the reasons and basis for the feeding of the cereals instead of legumes for racing, may not be so well known or understood.

The next item of importance is to realize that there are two major flight muscles of racing pigeons, as indeed there are for any flying birds. The first and more massive of these are the large muscles found on each side of the keel, and are those we feel with our fingertips as we handle the bird. These great muscles make up about 20% of the total weight of the bird. These muscles are known as
the major pectorals (pecks) and are comparable to the muscles that lie under the breast area of humans, although they are obviously much more powerfully developed in birds. As you might expect, the major pectorals are the most powerful flight muscles in pigeons, as they are in other flying birds: their main function is to drive the wing through the down stroke, which propels the bird forward. The other important flight muscles of pigeons are the much smaller and more deeply located deep pectorals, sometimes called the minor pectorals, which lie under the major pectorals right next to the keel. They make up about 3.6% of the total body weight of a racing pigeon, much less than the mighty major pectorals, their major function is to bring the wing through the upstroke.

Another important fact to realize is that, in birds, there are two basic types of muscle, based on the colour and function of these muscles. The first of these is white muscle such as that seen best in the pale breast muscles of the domestic chicken. The second is red muscle as seen most prominently in the dark breast muscles of birds such as pigeons, ducks and geese, among other flying birds, for example.

Both of these muscle fibres have a different role depending on their colour and we need to learn these differences to hone our birds to achieve the roles that their muscle fibres lend themselves to.

These fibres differ in their diameter, the white fibres have a larger diameter then the red fibres. All of these fibres are grouped together akin to pencils bunched together with an elastic band holding them. Generally the white fibres are towards the outsides of these bundles.

In pigeons the majority of the muscle fibre, especially in the two pectoral muscles is red. This red colour is related to the presence of myoglobin, a pigmented, oxygen carrying compound peculiar to red muscle in many species of birds and animals. By contrast, the predominance of white fibres in the breast muscle of the domestic chicken imparts a very pale and characteristic appearance to that muscle, because white muscle has very little myoglobin. These basic features serve to outline one of the major differences between a bird such as the racing pigeon, or any migratory species which is required to fly for many hours at a stretch, and a sedentary, non flying bird such as the chicken. There are other differences and we will explore them in more depth as we proceed.
In addition to differences in the diameter of these two types of fibres, what other distinguishing and significant features are there? Well, major investigations have shown that, in addition to having a narrow diameter, individual red fibres have an extensive network of blood vessels running and inter connecting over their surfaces. Red fibres also have a high capacity to take up oxygen, because of the presence of myoglobin, for the metabolism (or burning ) of fuel to produce the energy necessary for flight. Of very great importance of the racing pigeon is the fact that these red muscle fibres function (or as we say, they twitch) slowly.

Because these fibres twitch slowly during flight, they also tire out very slowly. It becomes obvious then that red fibres are those that can handle the sustained effort of rapid flight over many miles, whether the distance is a short training toss, a middle distance race or a major long distance event. In some special situations such as launching into the air, to be discussed later, evidence suggests that the red fibres are also capable of very rapid activity. However, their most important single function seems to be associated with the prolonged, sustained muscular effort of distance flying.

On the other hand, we note that the large individual white fibres have relatively few blood vessels running over their surfaces and that they have a very poor capacity to use oxygen, the burning of fuel, because they contain very little myoglobin. In contrast to the red fibres, these large white fibres function (twitch) RAPIDLY. As you might expect, because of their capacity to respond quickly, white fibres also tire out very quickly, and for this reason, it is important to understand that they can in no way be relied upon for sustained flight. If they do not function during prolonged muscular effort, what is their major role? Since white fibres twitch rapidly and tire quickly, they seem to be most important and useful during muscular effort that requires very rapid and even explosive bursts of activity. Thus, white fibres are those that likely operate most effectively to help launch a bird into the air and allow it to dodge in the wink of an eye when it encounters predators, power lines and other obstacles.

Although carbohydrates are used by the bird to provide energy for certain functions of flight as discussed earlier, there is no real evidence that, under normal conditions, protein is utilized as a source of fuel for muscular work. Only under extreme conditions, such as the complete depletion of fat and carbohydrate reserves, would pigeons be expected to use protein as fuel. What other supportive evidence do we have to conclude that fat is THE major fuel for
racing. Experimental work on the muscles of racing pigeons has shown that after as little as 30 minutes of muscular activity, the amount of fat circulating in the bloodstream of birds during exercise increases by almost 18% compared with that of non-exercised birds. These experiments, also showed that the amount of fat in the major pectoral muscles of exercised birds increases by 25 to 40%, and in the liver by almost 30%. Clinching these observations was the finding that the amount of fat in body fat depots located under the skin, within the abdomen, etc., actually decreases by almost 25% during this time. Therefore, as fuel in the form of fat is required by working muscle, this fat is mobilized from these various body depots and is transported in the bloodstream to the liver and to working muscles.

In the breast muscles, the presence of an extensive network of tiny blood vessels encircling each of the re fibres has some obvious purposes besides being an elaborate pipeline for replenishing supplies of fuel for these muscles, these vessels also bring an abundant supply of oxygen that is as necessary in the fat burning process (known as aerobic metabolism, that is, a process that requires oxygen) in muscle as it is in the burning of oil, wood or natural gas in a home furnace. As well, because of the increased production of heat by working muscle, this mesh-work of vessels is able to remove and help disperse this heat by carrying it to the lungs, mouth etc., and to remove carbon dioxide and other waste products of the metabolic process. One of the beneficial by-products of the metabolism of is water. During metabolism, the burning of one unit of fat produces nine units of water that, obviously, is of tremendous benefit to the bird during a long flight.

In the absence of fat as a reserve fuel, what fuel do the white fibres require? Close inspection shows that the major fuel for white fibres is glycogen. Glycogen is comprised of many units of the sugar glucose linked together. Because white fibres are believed to be necessary for the execution of split-second movements they must have a readily-available fuel to provide energy almost instantly, and glycogen is that fuel. Since the metabolism of glycogen to glucose by these fibres doesn’t require oxygen, it is therefore anaerobic metabolism ( without oxygen), and there is no need for a great network of blood vessels around each fibre to supply oxygen.
All this is fine, you say, but how can we put this information together so that it translates into something more comprehensible and practical?

As the birds await the time of release, we see that the white fibres are loaded with glycogen and that the red fibres are well fortified with both glycogen and abundant reserves of droplets of fat, their primary fuel. Storage depots of fat in various areas of the body have sufficient reserves for the long demanding hours of the race, but most of the birds are not overweight. There is a good balance between the amount of body fat and the physical condition of the birds. The liver also has adequate reserves of glycogen and fat that can be mobilized and transported in the blood to working muscles as they are needed. The birds have been well prepared for a distance event. Those that are slightly heavy may be at a disadvantage if it is a normal race, but if it is a tough one, their extra reserves of fat may save the day. All is ready.

The launch is a rapid, explosive action, and although we would expect the white fibres alone to operate here, it is important to recall that they constitute only 6% of the total fibres in the breast muscles, whereas the red fibres make up the vast majority or about 94% of the total number of fibres present. It does not seem logical then, that only 6% of the fibres could handle most of the tremendous amount of work involved in such a powerful action. Therefore, it seems very likely that all of the red and the white fibres working co-operatively together contract rapidly, propelling the birds upward, allowing them to gain height and to reach cruising speed.

It has been shown experimentally that within minutes after release, all of the glycogen reserves in the white fibres are completely exhausted, and for all practical purposes, their activity virtually stops for the moment, as a result of this depletion of fuel. In fact, these experiments showed that glycogen stores in the white fibres are completely depleted after the first 10 minutes of effort. By the time the birds have reached cruising speed, the number of wing beats has decreased from an initial explosive rate of 9.4 to about 5.5 beats per second. The red fibres, which are now doing all of the work, continue to be loaded with glycogen (note the important difference from the white fibres), and very significantly, with large reserves of fat, present as microscopic droplets.

This efficient system operates continually over the few to many hours of the race, and provided that the muscles have been sufficiently conditioned before hand to handle the distance and the weather conditions, they operate rhythmically throughout. On this point, there is evidence to suggest that once...
cruising speed is reached, the wings continue to beat rhythmically and automatically by reflex action that is centred in a small area of the spinal cord. This means that the basic rhythm of the wing beat in flight likely operates automatically, without any conscious effort or will on the part of the birds. It is worth noting also that not all of the red fibres in the great pectoral muscles are likely to be working at any one time. Instead, there is evidence that they work in shifts, thus allowing some fibres to rest and replenish fuel supplies from body depots by way of the bloodstream, whereas the great majority continue working.

Recall that within 30 minutes after the birds were released, fat in the great pectoral muscles had increased in amount by up to 40% compared with the amount of fat present in the muscles of resting birds. By 2 hours after release, the amount of fat in these flight muscles has increased even more and is about 85% greater than the amount of fat in the breast muscles of resting birds. By 5 hours, the amount of fat has increased by almost 170%, over four times compared with that found in the muscles of resting birds. These findings point up once again, the very great importance of fat as a primary nutrient in fuelling working muscles and the reliance placed by the bird on this key source of energy. The facts speak for themselves! The day wears on and the hours and miles pass. The very fit birds are in front as individuals or in varying sized flocks, fat continually mobilized from the body depots and picked up by the bloodstream, to be delivered to the massive pectoral muscles which are working rapidly and efficiently. Birds that are less fit are trailing for miles behind in differing sized flocks; the hours on the wing will take their toll, and it is inevitable that some birds will not be home by dark.

toward the end of a very long or tough day, we see that the situation regarding the fuel supplies within the two types of muscle fibres has changed remarkably. If we look again at the red and white fibres, we see that the large white fibres that became depleted of glycogen soon after the birds were released at the race point, are now, surprisingly, refuelled with glycogen! How did this happen and why? The “how” is answered by pointing out again that the liver has abundant reserves of glycogen, and it is likely at this source that glycogen was converted to glucose for transport in the blood stream to these muscle fibres, where in turn, it was reconverted to glycogen, its storage form. The “why” may be explained by looking at the obvious advantages of this refuelling process in the white fibres. After all, once the launch has been accomplished and the birds have reached cruising speed, there may be lightning fast aerial predators form which escape is critical. Power lines, telephone wires, cables, and the
possibility of collisions with other birds in the flock, are all potential reasons for rapid escape or avoidance, and the bird must be ready for dodging bursts of speed at any time during the race. The white fibres must be refuelled to take care of contingencies, and this replenishing process begins soon after these fibres were depleted following liberation. Even at the extreme time of 18 hours after release, these white fibres are found to contain abundant amounts of replenished glycogen.

Although fat and glycogen continue to be evident in the red fibres, reserves of both are becoming low. Most of the red fibres, especially those in the centre of a bundle of fibres, are particularly low in reserves of fat, but it is also interesting that others near the surface of a bundle have increased amounts of fat. These findings, among others, suggest that red fibres located close to the edge of a bundle are the first to begin work, and therefore, are the first to tire. As their “shift” is completed, they stop work to refuel, and their function is taken over by the next “shift” of fibres, which are located somewhat more deeply inside a bundle, and so on. Quite likely, long before these fuel supplies have decreased so drastically, the bird has begun to experience increasing signs of fatigue, as its all important major fuel reserves diminish steadily.

Well I hope that has given you a good insight into how your birds operate and should also allow you to appreciate them more, and more importantly educate you in what they need to function and win.

Anyway enough chit chat it is time that we got to the details of various nutrition and try to discover what is the best for our birds!

**Nutritional Components**

Nowadays, pigeon fanciers know that there’s more to feeding than just grain and grit. Certainly, grains are an excellent source of energy, protein, and fibre, but they are very low in the minerals, trace elements and vitamins required for the exertions of top racing and breeding robust youngsters.

Fanciers looking to succeed at the sport really need to be familiar with the theory of nutrition.

For pigeons this is really quite easy to understand.

The fancier must give:

Grain for energy, protein and fibre.
Minerals grits, powdered minerals and trace elements.
Vitamins are usually given with trace elements in the water.
Extra energy, vitamins and protein can be given in the form of special oils on
the food during the high energy times of racing and when the adults are feeding
young.

Pigeons can survive on grain and grit alone, but they cannot reach the level of
health required to withstand the pressures of racing or breeding. Eventually
their health will fail under these extreme physical pressures. Good feeding will
control most illnesses of pigeons. For example, there is a major increase in the
minerals and trace elements required when the adult pigeons are feeding babies,
but grit alone does not provide all of the necessary minerals and trace elements
for continuing good health. Without mineral additives the end result is often egg
laying problems, canker outbreaks and other illnesses. During racing there are
increased needs for energy, protein and vitamins, as well as trace elements and
minerals. The race team tires easy and is more susceptible to fatigue related
respiratory and wet canker illnesses when extra vitamins and minerals are not
provided.

The feed (grain) mixes do not provide enough vitamins and minerals for top
performance. The fancier must select a feed mix that provides the energy and
protein balance needed for the particular stage of the pigeon calendar. Breeding
and moulting birds require a grain mix which is higher in protein, has a
different essential amino acid balance than the pigeon in full training during the
racing season. The feed mix requires at least six different grain types in the mix
in order to get the best protein level and quality (i.e. balance of essential amino
acids). The best quality of protein is seldom met and lysine (a very important
amino acid for the pigeon) deficiencies are common in grain mixes with fewer
than 4 grains. The protein quality of the grain mix can be improved by adding
protein/amino acid supplements prior to feeding.

As you can see there are a lot of potential problems and pitfalls when it comes
to feeding, so I will take some time to educate you with some information on
nutrition, and specifically how it applies to pigeons.
Carbohydrates
Carbohydrates are the basic fast energy source for our birds, they are generally broken into sugar and starch, but also a further breakdown goes into the molecular structure of some of these carbohydrates.

Carbohydrates “burn”, they are broken down and give off heat energy now to simplify it you can get chain carbohydrates or branched carbohydrates.

Chain carbohydrates will burn up fast and is like the energy form a chocolate bar, you feel a boost but soon after you are hungry again.

Branch carbohydrates burn much slower and will give energy over a longer period of time, and since our birds will be flying generally for a longer period of time (in terms of how fast energy is used up) then these branched carbohydrates are what we are looking for.

Now do not get lost in all of this nutritional talk, I am just trying to cover all basis and after we have discussed various nutrition we will then go on to learn what food contains these important substances.

To get to more chemical detail with carbohydrates they can be divided into various saccharides, these are used as brain fuel and will give you a more detailed description of what your pigeons need.

Monosaccharides
These are sugars such as glucose which act as a very direct form of energy and are the only form that pigeons bodies can burn ( all others must be broken down into monosaccharides )

Disaccharides
These are longer chain sugars such as sucrose and lactose these are broken into monosaccharides so give a slightly longer term energy source but also should not be given in large amounts.

Breaking the links will use water and dehydrate your birds causing watery droppings.
Polysaccharides

Polysaccharides are a much longer term solution and fall into the starch family, this is the same principal behind athletes eating pasta instead of chocolate before a marathon, the long branched chain carbohydrates give energy for much longer.

Now pigeons function a little differently to humans, when eating a meal rich with sugar, glucose enters the blood stream. The liver then produces glycogen kind of like a glucose sponge, this holds onto the glucose until it is needed when sugar levels drop.

But with a pigeon if you already supply it with more glucose and glycogen then it needs then its liver will start to product fatty acids.

Fatty acids are the fuel that we want our pigeon to run on as they last longer then carbohydrates.

To give a little more detail;

Carbohydrates are the simple and complex sugars in feeds that represent the “quick” energy components of the diet, which allow the body to perform work of any kind until about an hours flight. Carbohydrates are important for our purposes as racing pigeon fanciers because they are the fuels that supply the energy for our birds to exercise around the loft, and to fly from both the shortest toss and the longest race. One of the important carbohydrates for many birds and animals, including humans, is the sugar glucose, sometimes also called dextrose.

In grains/seeds, the starch component (visible to the naked eye when a grain such as corn is cracked open) is comprised of many units of glucose, linked together in a particular large chemical configuration. After grains are ground in the gizzard, and the resulting mash is passed into the intestines, the starch is broken down (metabolised) into individual units of glucose which are then absorbed across the wall of the intestine into the blood stream, and delivered to the liver. Here, many units of glucose are assembled into a large chemical structure that is different from that of starch, and is known as glycogen. Hence, it becomes clear that starch is the storage form of glucose in plants and their seeds, and glycogen is the storage from of glucose in the tissues of birds and animals.
When glucose is needed by tissues in the body, glycogen in the liver is broken down to individual units of glucose, which are then exported in the blood stream to these tissues. For example, the chief fuel of the brain is glucose; a steady supply of which must be provided by the liver- which is why birds normally have a high blood level of glucose.

This is why you need to ensure that your pigeon is fed carbohydrate rich foods after a race to replenish its glycogen reserves so its brain can function properly (you need a properly functioning brain for everything else in the body to work!)

Both red and white muscle in the breast of pigeons must have a ready supply of glucose, many units of which are built up into glycogen for storage in the muscle, and for later use. During the explosive launch phase of flight, or during dodging bursts of energy during cruising flight, white muscle fibres in the breast utilize only glycogen as a source of energy for these actions. As a result, the glycogen supplies in white muscle are completely depleted very quickly (within the first 10 minutes or so after launch), and must be replenished to take care of other dodging emergencies that could occur during cruising flight. To replenish glycogen supplies in the muscle, the liver then begins to break down its supplies of glycogen to glucose, which is released to the blood stream and is transported to the white fibres in the breast muscles where it is again built up into glycogen, to be used as needed during emergencies in flight.

We have to take all we know about carbohydrates and put it together to try and get a full picture with regards to our pigeons.

We know a pigeon will only fly on glycogen for a limited time until its reserves are used up, this may be up to an hour depending on how high the levels of glucose in the bird are, and where they can be re-assimilated in the body.

So it is this first hour that is the most important, we need to make sure everything is optimised to gain an advantage.

As stated before there are “fast” carbohydrates (chain) and “slow” carbohydrates (branched).

Now pigeon racing is not a power sport like weight lifting, it is a endurance sport like marathon running. You need enough fast chain carbohydrates to get you up to speed but you also need enough long branched carbohydrates to take you over to the fatty acid reserves confidently.
As the blood sugar level rises so does the insulin level, so therefore having a lot of fast sugars will demand more energy from the pancreas to produce insulin, whereas the slow sugars will release overtime so the body can keep it in order.

Maximising the time your bird flies on its carbohydrate reserves before switching to fats is very important as the carbohydrates provide quicker energy, so therefore the pigeon will fly faster and therefore if your bird stays on its carbohydrate reserves 5 minutes longer then the bird behind it, it will pull ahead which may be a decisive factor in the race.

Fats
I understand that some fanciers, past and present, have the idea that any amount of fat is a hindrance, and that it is important to strip the birds right down to eliminate this unwanted fat, (to be replaced with what, I would ask? I continue to wonder what they believe the birds use for fuel in the first place!) True, excessive fat is a definite hindrance, but as fat is certainly the fuel on which birds race from short to long distance, this idea of stripping birds right down in weight is completely unwarranted, and not in keeping with the established facts about fuel requirements. I believe that birds for the shorter races need to be somewhat lighter in weight than those for the longer races, but the point is that all of them use fat as the fuel on which to race any distance.

Fats are the most important factor of pigeon racing, you bird will very rapidly deplete its carbohydrate reserves and then need to rely on fatty acids and fat reserves. You really need to get this right as too much fat will leave you bird carrying extra weight, and too little will mean it will have to start using its muscles to brake down for energy.

As we mentioned before pigeons function differently then humans as they can produce fatty acids in their livers when they have high amounts of glucose (more then needed for full glycogen reserves). A highly important role for glucose in pigeons is in the production of fat for sustained flight. Fat is unquestionably the key fuel for any flight lasting more than a few minutes, from a short training toss to a 500-mile race, and on to the marathons of 600 miles and more. You may recall a US study in which one group of pigeons was supplemented with 5% fat, and a second group was not supplemented. In races up to 200 miles there wasn’t much difference in the performances of the two groups. However, after 200 miles birds in the fat-supplemented group definitely
had better performances than those in the unsupplemented group. Once
clocking began, there were more birds clocked from the fat-supplemented
group in a given period of time than from the unsupplemented group. These
findings demonstrated the marked benefits of fat in providing birds with the
improved stamina and endurance needed to complete these races.

Just to stress this point, it has been proven that the liver of pigeons produces
almost 50% of the fat for use in the body, and that it regulates fat production in
the body. (Of course, fat for use in the body is also derived directly from the
diet.) One study in the US several years ago showed that when glucose was
injected intravenously into hungry young pigeons, there was rapid conversion
of this glucose into fatty acids in the liver—within three minutes—a fact that
indicates an amazingly rapid ability of the liver to produce fat from glucose!

The source of the glucose for conversion to fat in the diet is primarily the starch
component of grains and seeds, and can also be supplied as glucose powder
added to drinking water. Fat is stored in the liver but it is also exported from the
liver in the form of fatty acids through the blood stream to storage depots in the
body cavity among the intestines. Some of the fatty acids are also exported to
the breast muscles and stored in the red muscle fibres as microscopic droplets
where they are ready to be used as the key source of energy for prolonged, rapid
flight.

Fatty acids are of massive importance to our young pigeons, it has been
scientifically proven that providing the right amount of essential fatty acids
form a young age boost intelligence as well as a hoard of other factors.

Fatty acids such as the omega 3, 6 and 9 are some of the most useful essentials.
These essential fatty acids cannot be produced by the pigeon so including them
in its diet in the right quantities and ratios is of great importance.

These are needed just so the bird can function properly. For pigeons a rule of
thumb is to have twice the amount of Omega 3 fatty acids as for Omega 6 fatty
acids, this will help to strengthen your birds immune system and also aid the
functioning of the central nervous system.

Another benefit we will later come to is the fact that burning fatty acids is a
very clean process, when you burn carbohydrate and proteins you are left with
lactic acid build up, but fatty acids are not the same, they allow your bird to continue at a constant pace burning the fuel with not detrimental effects to it. Fats are also beneficial to the pigeons to metabolise, the after products from these reactions are just moisture. So feeding your pigeon a fat rich diet especially a couple of days before you ship will give it the best chance at success. Sunflower and safflower can be a great way to get fatty acids into your pigeons diet.

Now when it comes to race week you need to think carefully about your pigeons fat intake, you will want to feed your bird some fatty seeds such as flax and rape seed two to three days before, this will give enough time for the fatty acids to pass into the red muscle fibre of the birds so it can be stored. This is because after the carbohydrates are burnt off, it goes quickly to the fatty acid in the blood, and when that is gone you need to have a long term supply stored in the red muscle fibre to give your bird the best chance for success in the race, and to make the flight home without damaging its muscles.

Now, in birds, in general, it has been found that: 1) high levels of fat in the diet will reduce the amount of fat the liver is capable of producing, 2) that high levels of protein in the diet will also reduce the amount of fat the liver can produce: and, 3) that high levels of carbohydrate in the diet will increase the amount of fat the liver can produce. In the basis of these facts, it seems obvious to me, firstly, that in preparation for a race, high protein grains like peas should be fed a reduced level, and, secondly, that high fat grains should be fed in moderation, and thirdly, that when high fat grains are used at all, there should also be a lot of high carbohydrate grains fed, as well ( hence as we will discover later we use large amounts of corn in most race mixes).

But also as I just mentioned, you will want to ensure that there are some fatty acids in the blood closer to the race then that to give the energy for the crossover from carbohydrates to fats. But do not over do it, some of these seeds contain other chemicals( such as prussic acid) that will be damaging to you pigeons so only include them as about a tenth of your race mix.

Don't worry too much about all this at the moment, towards the end of the book we will go over various mixes for breeding, racing etc.!
Proteins

Proteins are very important for our pigeons as they are what they are made of, simple? But you must remember that a lot of proteins are hard to digest, so therefore they are not your ideal nutrient for the two or three days before a race.

We mentioned several times earlier that if a bird exhausts its fat reserves it will start to turn protein into energy, and this is a bad thing because as I just mentioned the pigeon is made out of proteins. This results in muscles and organs losing mass as the body turns them into energy to keep flying. (just another pointer to plan your fats well!)

The amounts of and perhaps more importantly the type of protein are very important to the performance of your bird. To have a basic split, there are proteins that are easily accessible and those that are not. The latter are hard to digest and can thus use a lot of water by your pigeons and dehydrate them (this is not good!).

Proteins are also known as amino acids (well amino acids are the building blocks of proteins) and legumes are a great source of protein. But unfortunately legumes (such as peas and beans) are difficult to digest, less than half of them is usable so the bird has to spend energy to remove the useless bi-products. But protein is needed to build and repair muscles so it is essential to a strong racing pigeon.

This just goes to reiterate the point that legumes are a food for the start of the week as they can take three days to be properly processed to repair the bird, they are not needed as fuel so are unnecessary for race feed.

To compensate for not feeding the legumes you will find that grains and seeds provide more than enough accessible protein to do the least amount of damage whilst providing fatty acids in most cases.

If you bring high energy branched carbohydrates into the meals (such as corn) you can cut down the amounts of grains and seeds provided that the birds fat reserves have been fulfilled in the first portion of the week.
Some amino acids are essential to pigeons (similarly to the fatty acids, they cannot produce themselves). Food sources will be given a value depending on their amino acid content, the more of the essentials that are included, the better the biological value. A couple of high value substances are yeast, soy bean and as we will mention later, certain forms of algae.

So now we have covered the three main nutrient sources for energy, now we shall take a quick look over the extras that will come with the carbohydrates, fats and proteins but may be supplemented for increased performance in areas.

**Vitamins and Minerals**

Vitamins and minerals are essential for a great many bodily processes, and without them some crippling deficiency can be found.

**Vitamin A**

Vitamin A plays a function in Vision, Gene transcription, Immune function, Embryonic development and reproduction, Bone metabolism, Haematopoiesis Skin health and Antioxidant activity.

The first of these, vision is very important for our pigeons as it is thought to be their primary navigation system.

Found in greens such as silver beet and spinach and also carrot. Pigeons love a plate of mixed chopped greens and some will eat diced carrots. Dilute carrot juice can also be placed in the drinker. There is no risk of overdose here as the vitamin A is only found in its precursor form and the body will not absorb this and convert it to vitamin A if it is not needed. It should be noted that cod liver oil also contains good levels of vitamin A. Cod liver oil, however, also contains gizzerine, which is associated with stomach ulcers. This oil can also lead to vitamin E deficiency if allowed to go rancid, which it does quickly if exposed to sunlight, for example if it is mixed earlier in the day rather than being fed immediately.
Vitamin B6
This is used in the “burning” of carbohydrates, so therefore is very important to your bird so that they effectively gain energy from their foods.

Vitamin E
Vitamin E is massively important, especially during the breeding and racing seasons. Vitamin E helps the circulation, it helps strengthen the heart and increases red blood cell count, thus increasing oxygen capacity in the blood, thus increasing aerobic fitness. It also helps create healthy sperm and regulate the ovaries, hence is important for the breeding season.

Vitamin B12
Whilst not as important as Vitamin E, Vitamin B12 help to activate the birds metabolism so is a good idea to help bring into its diet just before the race day. Vitamin B12 is low or absent in almost all grain it is found in Baker’s and Brewer’s yeast (along with many other micro-nutrients)

Vitamin B5
This is another one that is good to include as it helps prevent infection, which is always a bonus!

Vitamin K
K vitamins are generally used in metabolism in the bones and tissues, as well as easing the use of certain proteins. There are two sorts of vitamin K produced naturally, vitamin K1, which is found in green leafy vegetables, and vitamin K2, which is produced by the normal bacteria in the bowel. Vitamin K2 levels can become low after antibiotics if probiotics are not used or if pigeons are not allowed to eat their own droppings.
Vitamin B2
Vitamin B2 (riboflavin) plays a key role in energy metabolism, and for the metabolism of fats, ketone bodies, carbohydrates, and proteins. Found in yeast. I recommend an inactivated (sterile) dry yeast, e.g. ID Yeast, added to the seed after pre-moistening with a seed oil.

Vitamin B9
The human body needs B9 (folic acid) to synthesize DNA, repair DNA, and methylate DNA as well as to act as a cofactor in biological reactions involving B9. It is especially important during periods of rapid cell division and growth. Children and adults both require B9 in order to produce healthy red blood cells and prevent anaemia. Also found in yeast products but also wheat germ. Wheat germ oil is excellent to use as a moistening oil on grain. Added usually at the rate of 0.5 – 1 ml per kilogram of grain. This oil can be used to stick a yeast powder to the grain. The result is an especially nutritious meal. I know my own pigeons recognize the sound of this blend being mixed in their feeding bucket and start to act like kids waiting for lollies. Many of the better conditioning oils are based on wheat germ oil, e.g. Polyseed Oil.

Vitamin B3
Vitamin B3 (niacin) has an essential role in metabolism (like most B vitamins) and also is used in DNA repair. B3 is also found in yeast products. However, one seed that does contain good levels of niacin is sunflower. Do, however, be careful both sourcing and storing sunflower seed as it is very prone to fungal contamination.

Minerals and Trace Elements
These are another area that like vitamins are found in a lot of the foods you will be giving your birds anyway, but it does not hurt to know what they do and how they can be of benefit to your pigeons. You will find that a lot of these can be fulfilled by providing a pick stone and fresh grit every day, these can be of great use to the birds especially when moulting.
Minerals along with proteins make up the building blocks of the body – muscles, feathers (hence the importance of minerals when moulting), skeleton, blood, many many other essential body parts.

So let's start to discuss the advantages and uses of some of these minerals;

**Iron**
Used in the haemoglobin that carries oxygen around the body, deficiencies result in Anaemia and health problems. Use 50 mg per kilogram of feed.

**Sodium**
Sodium helps to strengthen the nervous systems signals and those of the muscle fibres. Deficiencies can lead to moult problems. 0.15% of daily diet.

**Calcium**
Calcium is essential for bone and muscle formation, without it crippling growth problems can arise. 0.6% of daily diet.

**Phosphorous**
This is also used for bones in conjunction with Calcium, deficiencies can also lead to growth problems. 0.5% of daily diet.

**Magnesium**
Magnesium is used in body cells and in enzymes, it helps to get energy out of food by activating metabolic processes, deficiencies lead to growth disturbances. 150 mg per kilogram.

**Potassium**
Used in the blood and other bodily liquids, it helps to provide stimulation for nerves also. Deficiencies cause growth and moult disturbances. 0.1% of daily diet.
Sulphur

Sulphur is a very important mineral as it is used to form feathers and the beak of birds, for obvious reasons this is an important addition to a moulting mix. Deficiencies will be seen as feather disturbances or bad feather conditioning. 10 mg per kilogram of feed.

Chlorine

Helps to regulate pH values in cells and fluids, deficiencies can cause growth and development disturbances. 800Mg per kilogram.

Copper

This is a vital component of many organs in the body, it is used in the formation of haemoglobin and helps the absorption of iron. Deficiencies can lead to damage to the veins and arteries. 2.5 mg per kilogram.

Cobalt

Cobalt is used in vitamin B12 which helps to regulate metabolism it is used for a great many organs such as the liver and kidneys. Deficiencies lead to weight loss and anaemia. 0.1 mg per kilogram.

Chromium

Chromium helps to enzymes that metabolise proteins and also boosts insulins effects. Its deficiency signs involve growth, development and moulт disturbances.

Fluorine

Fluorine helps to increase feather and skeleton stability, deficiencies lead to bone problems and feather issues. 0.3 mg per kilogram of feed.

Iodine

Iodine is a component of thyroxine, this helps growth and can regularly be a main deficiency of pigeons. 0.3 mg per kilogram.
Manganese
This mineral help many things such as the uptake of many water soluble molecules, it is a component of cartilage and it also helps to fight free radicals. Deficiencies can arise when feeding high amounts of barley, and signs are often weak youngsters and bad skeletal development. 25Mg per kilogram.

Zinc
Zinc is necessary for bone growth and development and also protein synthesis, it helps feathers and also hatching eggs to develop correctly. Deficiencies arise as growth problems or feathering disturbances. 25 mg per kilogram of feed.

Molybdenum
Very important to the liver, spleen, brain, blood, kidneys and feathers. Molybdenum is also used to aid metabolism and its deficiencies would lead to growth and moult disturbances. 0.1mg per kilogram.

Selenium
Selenium is used for protein absorption and development in youngsters. Deficiencies lead to bad bone development and growth problems. 10Mg per kilogram of feed.

Silica
Silica is used to form stiff feathers, without it feathers lack the stability for the birds to fly. 10 mg per kilogram.

Other Chemicals
I just wanted to take the time to run over a couple of chemicals that are said to enhance performance and could be of benefit to your birds.
Creatine

Creatine is a natural based chemical which comprises your first energy system, (the anaerobic one before lactic acid). Essentially it is a quick release energy and the creatine supplements can help to give a bonus there, it helps to supply the muscles with energy to contract harder and faster.

So whilst creatine does sound promising, its attributes do lend itself more towards activities like body building, and in the pigeon world the races are more endurance then speed and power.

Creatine is also thought to help aid recovery. Whilst again sounding good it should not be a problem for your birds if they had sufficient reserves of fatty acids to not eat away at their muscles.

This is coupled with the fact that I have not read a paper, or seen any research into creatine used with pigeons so I cannot be one to judge, but it would seem that the product is a waste of money in this area.

Carnitine

Carnitine is a compound that is found in a birds body already, but research has been done to say that higher levels can help the birds endurance and protect the muscles. Experiments seem to show that it helps to transport fats around the body and also helps to add efficiency to their combustion. It also does indeed seem to protect muscles by reducing the amount of lactic acid produced that wears them down.

The amount of carnitine you use can be important as overflowing the pigeons body with it can cause anger and health problems. If you use about 5ml of carnitine per litre of water you should be okay.

You need to include this in your birds diet for about three to four weeks for it to take effect, and more importantly you need to keep a very high fat oil content in the diet. This way the pigeons enhanced fat metabolism will use the fatty acids in the blood and muscles before using the fat reserves that you will want to save for the race.
As well as a higher fats diet, you need to make sure there is enough lecithin in the diet, I will go on to explain its purpose next.

So our conclusion is that carnitine can be useful for long distance flights if used correctly, but I would not recommend that this is used all the time as it can end up demanding too much of the pigeons system which is never wanted.

Lecithin helps to emulsify and convert fats, this is very important as pigeons lack a gall bladder that usually produces bile to do the job. It is very important that a decent amount of lecithin is in a pigeons diet so that the fatty acids can mix with the blood and be transported more easily, helping circulation that increases physical and even mental capacity. A good source of lecithin is soy beans.

Test have been done to show that cells cannot function or exist without lecithin, it helps the heart, brain, veins, nerves and memory which are all of great importance to our birds.

It is also the cheapest oil that helps to improve the production of brain cells, so financially it is a good way to go to give our pigeons an edge when flying home.

A simple 1% addition of lecithin to feed can massively help your bird performance. I do not want to convince you to put your life on it, but it's just one more nutrient or compound that I am telling you about that may help your birds come out on top.

It also aids in processing proteins, which as we have stated before can have large amounts of useless components. So if lecithin helps more of the protein get used up, it means less waste must be processed, it means less water is used to process them and it means your birds do not get as dehydrated or have wet droppings.

If you add a higher amount of granulated lecithin for about a week before a race, combined with a high fatty acids diet you can help to keep your birds endurance on form.
Electrolytes

Electrolytes help your bird to regulate its salt levels and retain moisture. This obviously is a good idea to think about on hot days, this is also the reason that sports drinks are often referred to as electrolyte drinks as you get hot when exercising so you do not want your sweat to leave you dehydrated.

Electrolytes are generally a mixture of some of the minerals that we have listed previously, which as you can see are a good idea to include in a pigeons system. The electrolyte minerals are generally simple to absorb into portions of the blood because they are paired up a chlorides and carbonates etc. This allows the ions to separate in a liquid solution and get to the places that they are needed. Besides the salt minerals they usually have some sugars included to help give an energy boost and keep the body working effectively.

The real bonus to electrolytes is that they allow your birds to retain more moisture, so if used a day or two before the race they can stop your pigeon becoming dehydrated in the race, and even a 1 or 2% decrease in a bodies moisture content can have very detrimental effects.

This become very important on a hot day where the bird is likely to lose more moisture naturally. As the electrolyte supplements contain salts they can sometimes dehydrated your birds when they ingest them, so essentially if you give your birds a lot of pure water after the electrolytes it will allow them to overcome the dehydration, and then store up more moisture as a result of the electrolytes.

Water

Now although this sounds strange, water can be something to take into account when perfecting your fancier skills. After all most creatures are made up of at least 80% water, so surely it is the most important substance we could need to talk about?

Seems simple to spew out a load on proteins and carbohydrates, but for water you would think that there is just water, and water is water so what's the problem?
Well as we know you can get tap or spring water, tap water is generally processed and monitored to reach a base line set for human health standards (in most countries).

Tap water is generally seen to be less pure, with chlorine and sometimes fluorine additives to kill bacteria and sometimes help strengthen teeth. Spring water on the other hand is generally filtered through a vast amount of rocks to purify it.

Water is though to be the most important substance to life full stop. If you have watched any of these “search for life in the cosmos” type programs you will see that the general belief is that if you find liquid water then you have the potential for life. This has come after the discovery of “extremophiles” or organisms that should not be thought to be able to exist for example, bacteria living in battery acid conditions or alkaline lakes, living in super heated or frozen environments. The one thing they all have in common is they need water, so this just goes to show that water is essential so its best that you get it right.

Water can be given a value dependant on their quality, this is called the Bovis value. Healthy water is said to have 6,500 units, tap water can have between 100 and 4,000 units and mountain spring water is generally around 8,000 units. The are some specific sites said to have healing water, this can give a Bovis value closer to 40,000. So there seems to be some ranking systems so surely the higher values will be better for both you and your pigeon.

Water is said to have micro-vibrations, these are caused by imperfections in the water and still remain when the water has been purified, these vibrations may cause disturbances in the body and not allow the full potential of the life giving elixir to do its job. Fortunately you can purchase an apparatus at the source of the water distribution system, this aqua-vitaliser will help to remove harmful vibrations and give the water a Bovis value of 30,000 to 80,000.
This apparatus can be purchased and left without maintenance and requires not extra input from electricity, magnetism, chemicals etc.

This process seems to be able to deliver a great many benefits such as, body detoxification, purification of the organs and cells, giving a youthful effect to the skin, helping assimilate nutrients and also just plain tasting better.

So this is just one more suggestion you may want to take into account if you are looking to take your sport to the next level.

Food Nutrition

Now we have a basic understanding of what chemicals and compounds are used for what, we can start to analyse various food type to find the most effective to use in our breeding, moulting and race mixes.

First and foremost, the food must be of the best quality.

Good quality grain is a clean grain with low moisture content. Grains with high moisture and/or are dirty, dusty and not cleaned are more susceptible to fungus and bacterial germs and poisons than dry clean grain. The truth is that germs on and in the grains will affect the performance of your birds during breeding, moulting, showing and racing. The food used for racing pigeons must be fresh, clean and the highest quality.

The simple fact is that cheap food is never the best food.

The farmer receives more for the graded feed than for the weather affected (water, heat, hail etc.) grain sold primarily as stock food. Some produce merchants buy this food for the pigeon fanciers to keep their prices down, but fail to understand that ungraded feed is susceptible to moulds and mould toxins that destroy the nutritional content of the feed. These moulds are a major health hazard, predisposing the race team to many illnesses. The poor quality grain simply fails to provide the required energy and nutrient needs of the competing bird. The result is poor performance and flock illness.

Nowadays, the grain merchants make a big effort to provide clean food, free of fungus, bacteria and toxins.

Most fanciers now understand that the quality of the feed does have a substantial effect on performance and they purchase “farm fresh” feed guaranteed free of moulds and mould toxins.
The feed must be stored correctly and protected from moisture and rodents. The correct storage of your grain after purchase is necessary if you are to preserve its culture-free status. If you allow moisture to infiltrate your feed then mould and bacterial contamination will most likely ensue, thereby nullifying all of your best efforts to provide your birds with the very best food. If your grain is very dry and culture tests clear then it must be stored in an airtight drum and elevated off the ground. This will protect your grain from absorbing moisture from the surrounding air during times of high humidity (e.g. rain periods and with night time high humidity). Grain high in moisture is best mixed with a mould inhibitor (PEP). Then it is stored with an open lid to allow it to dry out in times of low humidity and sealed in times of high humidity. The fungal spores resident on moist grain is more likely to become activated when stored in the dark and without air circulation to help dry it out.

Flax Seeds

Flax seeds come form the Flax plant native to the Mediterranean and India. Flax is usually pressed to capture the flax oil (also called linseed oil). The remaining bi-product is called linseed meal, used in livestock feed. Its seeds are very high in Omega 3 fatty acids but also contain a relatively high amount of prussic acid so adding them in large amounts to your mix would not be a good idea. Flax also increases the production of phlegm (that lovely green ghost busters type stuff in your throat) so it is best used at the start of the week. Flax is also quite low in fibre, and you need a certain amount of fibre for the intestines to function correctly. For these reasons flax is generally best left to about 3% of your race mix. Flax also promotes good blood flow and can give your birds feathers a lovely shine, this can be achieved by boiling a litre of water with a tablespoon of flax seed for about 10 minutes, then remove the seed and let it cool. You can then feed this to your birds when they moult about three times a week and they well have lovely shiny feathers. Flax seed oil should not be consumed in any large quantity as it can cause imbalances in essential fatty acids.
Hemp Seed

Hemp is a relative of the cannabis plant and is also one of the most easily cultivated plants on the planet. It is of use to us because like the flax seeds, hemp and hemp seed oil have a high amount of Omega 3 fatty acids. It is not just that they contain the Omega 3 fatty acids, it is that their ratio of Omega 3 to Omega 6 is a very good as the ideal for pigeons is about twice the Omega 3 as Omega 6 (the omega 9 acids can be created by the pigeons already). Hemp makes a good component of a more long distance race mix as it contains about 25% highly digestible protein which is great to access if the birds fat reserves should run out, a good bench mark is about 5% of a long distance race mix. This factor makes the hemp ideal for a breeding mix as its proteins are a lot more accessible then say the majority of those in legumes like peas and beans.

It has a very complete amino acid profile when compared with other protein rich substances like milk or cheese. Unlike Flax seed, hemp can be consumed constantly without the risk of unbalancing the birds essential fatty acids. Whole hemp seed provides good portions of calcium, iron, phosphorous, magnesium, zinc copper and manganese.
Cabbage Seed

Cabbage is a well known leafy green vegetable, and fortunately for us its seeds can be very useful to us fanciers as well. Its seeds contain a good ratio between the Omega 3 and 6 fatty oils but like flax they also contain relatively high amounts of prussic acid and also do not have a massive amount of fibre to help digestion. Cabbage is fast growing and because of this its seeds absorb a lot of sulphur and as we stated in the minerals section, sulphur is very important for feather formation. So if we include cabbage seeds in our moult mix it will help our pigeons develop full and functioning feathers. This is because feathers require keratin (the same stuff as in our fingernails). This protein contains sulphur and requires a lot of the amino acid cysteine, cabbage seed is one of the food sources that contains a significant amount of cysteine so is a must for the moulting mix.

Rapeseed

Rapeseed oil can be of great use to us pigeon fanciers because of its good ratios of Omega fatty acids, so a combination with many of the previous sources such as the flax and hemp are a good idea. It too also has a good amount of digestible protein furthering the fact that you should use a seed and grain mix over a legumes mix for your birds. Rapeseed like the cabbage and flax, contains prussic acid so it is good to use...
them in combination, but to limit how large or a percentage you add to your mix (10% all together is generally the maximum). For a long distance race mix it would be a good idea to use about 3% rapeseed, to keep it balanced with the flax.

Really rapeseed should be handled in a very similar way to the flax seed, they also are good to feed to your birds before a race but you must make sure it is given a couple of days before so the essential fatty acids can spread to the red muscle fibre for storage.

Rapeseed is another fast growing crop and so absorbs a lot of sulphur making it a good component for our moult mix to help with the cysteine needs and let your birds produce nice feathers.

Sunflower Seed

Sunflowers are native to America and have been cultivated for over 2000 years. Their seeds are what is of interest to us. What you will tend to find is that sunflower seeds are used a great amount in feeds, although if you look at their fatty acid profiles they contain completely wrong ratios of the omega 3 and 6 oils. This off ratio can cause immune system deficiencies and bowel inflammation. These seeds can generally be replaced by rapeseed, flax seed, cabbage seed, hemp and toasted soy beans. This is not to say that sunflower seeds are all bad, they do contain a high amount of fats, but you just have to keep in mind that the proportions of Omega 6 to Omega 3 are 630:1, which is a large imbalance so make sure you balance them out with a lot of Omega 3 rich seeds.

Sunflower seed also does not, contrary to popular belief contain any Vitamin E
so you must make sure you find other areas to get this supplement.
A good use for sunflower oil is a mix with Lecithin which in pure form is a very thick, treacle like liquid, the thinner sunflower oil makes it easier to add to food.
And advantage of Sunflower seed is that it does contain a good amount of dietary fibre, this allows it to make up for the fibre deficiencies in flax and cabbage seed etc.

Safflower
Safflower is nutritionally very similar to Sunflower, and there are two main varieties, one that is high in mono-unsaturates and one that is high in poly-unsaturates (the latter is the most common on the market).
Like sunflower seed, safflower does contain a high amount of fatty acids, but again these are not in the proportions that the pigeons require to be healthy. There is a lot here that I could just repeat for safflower but we have covered a lot on sunflower and the two are reasonably similar as I stated before.
Safflower I still a good idea to include in a race mix at about 2.5% of the mix.
Safflower does have an advantage though, foods containing high fibres, (like high protein foods) take water to digest and thus dehydrate your birds. If you have a choice between Barley and Safflower for fibre, you are best off with Safflower because it also has a high energy content.

Barley
Barley is the fourth largest crop grown in the world. Most areas plant barley in the spring and harvest in the summer, although some farmers plant in the fall as a winter
annual. The grain is used to make beer, in livestock feeds, and in cooking. Barley, like other cereal grains, is high in carbohydrate. Barley can be a great component of a feed mix, if in the right proportions. It contains eight essential amino acids and can help to regulate blood sugars. It does not contain any Vitamin A, but does contain reasonable amounts of Vitamins B4, B5 and D, but unfortunately not much Vitamin E. Barley also contains a good amount of the disaccharide maltose and also various polysaccharides, which can act as a good carbohydrate source for your birds. These carbohydrates are fast acting and can keep your birds fuelled well for about 30 minutes.

Barley cannot become to large a portion of the diet though as various health problems will arise. To name a few of these; Manganese deficiencies that will cause skeletal formation problems for juveniles, also mycotoxins can form on barley that are metabolites of fungi, they form when a mould arises on the barley, but removing the mould may not remove the mycotoxins so it is just something to beware of. Large amounts of barley can also cause dehydration because of their fibre content, a large amount of fibre requires water to process, and thus dehydrates the birds. This fibre can in cases such as a breeding mix be a bonus though, it is not uncommon to use up to 75% fibre seeds and grains in a breeding mix to really make sure the system is cleaned out.

It has also been said that barley give crop inflammation, this is down to the barley still having the beard attached, this can irritate the birds and cause inflammation, though most commercial barley has had the beard removed so this problem does not arise.

Regardless Barley should comprise about 5% of any race mix because of its quick access carbohydrates.
Corn

Maize or Corn is a native American plant and has been cultivated for thousands of years, it is a big one for pigeon fanciers as it contains a large amount of varied carbohydrates but there are also some downsides to it as we shall discuss.

Dent corn is very popular grain that is high in carbohydrate but low in protein. Over half of the corn grown in the United States is used in livestock rations. A lot of argument can arise when talking about if corn is a pigeon food or not, many swear by it but all to often you can find that the birds just are not interested in it and leave it, especially in hotter months. A lot of fanciers try to use a lot in their breeding mixes, which is unnecessary as breeding mixes require protein of which corn is lacking. But also corn as a carbohydrate is a very good branched energy source, it contains a lot of different polysaccharides and releases its energy over time, this then make the pigeons leave the corn if the weather is hot as they will overheat (and why corn should come more into a winter mix then a summer one).

It turns out that all of the waste is just mistaking the pigeons needs, they are honed through millions of years of evolution, so therefore they know what foods they need and what they do not.

Corn is about 70% starch which makes it a great item to involve in a distance mix, usually the effects start to show after 45 minutes of flight so this can carry the bird on well without the need to activate reserves of fatty acid in the blood.

There are a great variety of corns but you must always remember that it is not what they look like that counts, it is their nutritional values and the variety of long branched starch molecules they are made up of. Some of the most attractive looking varieties are actually the least nutritional.

Corn also has an advantage of containing Vitamin E, if you feed your birds some corn germ oil they will get a nice little boost to their vitamin supplies.

Also the red corns tend to have more Vitamin A then yellow corns, but you must not let this effect your search for high quality corn starch.

Similarly to barley, corn can contain toxins, this time they can contain alphatoxins and mycotoxins that are very had to detect as they are produced my mould, but may remain when the mould is removed, and if the mould was there in the field then you will not know if your food is toxic.
Corn also contains lower levels of phytinic acid than a lot of other seed food, this phytinic acid interferes with the uptake of iron, and iron is used for the red blood cells which in turn carry oxygen around the body. So it is good to reduce the amounts of this acid where possible.

Corn can make up a good portion of a race mix if taken later in the week when a bird has already gained sufficient fat reserves and had a cleansing mix, this can make sure the bird has a good energy supply for every stage of the race and every stage of its energy systems. Corn oil also has a good proportion of Omega fatty acids, its ratio of omega 6 to omega 3 is about 5:1.

Good amounts for races should be about 30% corn in a sprint mix, and slightly more for medium to long distance, about 35%. A lower percentage of corn can also be used in breeding mixes for your birds, about 15% and for moulting mixes the corn content can be even lower.

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Oats

Oat groats are the portion of the oat grain, minus the hull. This highly digestible product is used in a few pigeon mixes. Oat groats contain more protein than corn, but are lower in carbohydrate. Oats are grown in many countries, mostly in cooler areas.
Peanuts

Peanuts are a great source of energy especially in the longer races as they contain a lot of fats. But unfortunately they are also susceptible to mycotoxins and as we have explained before, these can be tricky to spot.

But this should not lead you to be scared of feeding your birds peanuts, the nuts are tested for metabolites before they are packed so it is just up to you to keep the peanuts in good condition. A peanut should be white inside and have no spots, it should also be crisp and not tough or soft. It should not have a long lasting after taste and should not be wrinkled.

It is just good to check as peanuts are a very good source of fats that are easy to digest, as long as they are in a dark, cool, dry place there will generally be no problems.

Peanuts also have an imbalance between omega 6 and omega 3 fatty oils, having far more omega 6 then 3, again this should just be taken into account to try an close the gap to stop the associated health problems.

Combining peanuts with sunflower seed and safflower can be a great advantage a few days before shipping for a race, it help get the metabolism active and gets fats available in the body. Peanuts can also be of value in a moult mix as they contain high value amino acids that help the pigeons to produce high quality feathers.
Many are afraid of peanuts because of the toxins problem, but if you use them you soon learn that the risks are greatly outweighed by the benefits of such a diet. When these types of food are produced they are monitored for toxins and only allowed to be sold if they contain under a certain amount in parts per billion. As stated before, alphatoxins and mycotoxins are produced by mould, but they do not multiply. They are just left behind if a mould is removed so as long as your food is not getting mouldy then it should be fine.

The only benefit of feeding peanuts will be if it is done a couple of days before the race, the fats need two or three days to find their way to the red muscle fibres where they are stored.

You only need to give a couple of peanuts to a bird for three or four days up to a race for them to be effective.

Soy Beans

The soy bean is a legume native to east Asia, and whilst we have tried to almost disregard legumes so far in exchange for fatty seeds, it is always good to look at all your options.

Soy beans should always be toasted as they can contain toxic trypsin inhibitors that are harmful to most creatures.

To explain this effect, the pancreas, located in the first loop of intestine after the gizzard, secretes into the intestine, a digestive enzyme know as trypsin, which is important in that it splits proteins into their amino acid components.

According to a friend who is an expert on the subject, soy beans, as well as maple peas contain very high levels of substances that interfere with the activity of trypsin, which, in turn, prevents the proper digestion of proteins in the diet.
For this reason, it seems advisable to keep the percentage of soy beans and/or maple peas in a ration to perhaps 5-10%, to reduce the effects of this anti-trypsin activity.

Soy oil contains a good amount and ratio of the omega 3 and 6 fatty oils and it is also a complete protein, containing all essential amino acids that the birds cannot synthesis themselves.

Generally in low legume mixtures the soy beans are retained because of this complete protein profile making them very valuable in the right quantities.

Soy beans should comprise about 5% of any race mix, this is because its protein content is so high that if given the choice, pigeons will leave it after a few days of eating it.

When using such high protein mixes it is best to feed little and often, try to feed the birds about four times a day so that the digestibility of the protein will be raised. Soy beans also help regulate blood sugars and increase intestine function. Another great nutrient of soy beans is lecithin that we talked about earlier, this helps to increase brain activity and emulsify fats so they can be processed more readily by the pigeons during flight.

Pigeons are generally not very keen on soy beans if they have the chance, and they are especially not to be overdone in a breeding mix.

Soy beans contain twice the sulphur containing amino acids of most peas making them very hand to include in a moult mix. Along with these amino acids they also contain a lot of unsaturated fats that are very good for a healthy set of feathers for your pigeons, but I must stress to not overdo it, everything must be balanced right.
Peas

There are several thousand different species of peas grown throughout the world. The garden pea and field pea are grown for their seeds. Field peas will test approximately 22-23 percent raw protein. Peas can be useful as part of a pigeons diet as they are legumes that contain a lot of starch molecules that burn over a long time to supply energy before the fatty acids in the blood. The two peas we will tend to use are Dun peas and green peas, nutritionally these two peas are reasonably similar so we will just class them as peas. Peas contain high amounts of Vitamins C and B1 as well as reasonable amounts of several other B vitamins. Peas can be used in both sprint and long distance races at about 12.5% in sprints and about 15% in longer distance races, usually with more Dun peas then Green peas. Peas generally are the hardest proteins for pigeons to digest, this can then use up energy and moisture which weakens the bird, then the wrong types of intestinal bacteria are more likely to take over and then we know what happens!

Generally if you go for lighter mixes for the youngsters they will become easier to train and more effective racers.

The portions of peas mentioned before should not prove problematic for your birds, but essentially they could be even lower if you like. For breeding mixes if you use fewer peas and more hemp, soy beans and sunflower you will find much more success. It is even possible to remove peas entirely from a breeding mix, where as more breeder see legumes and peas as the only sources of protein. This is simply not the case, as in fact we can get better results with more digestible protein from mixes with fatty seeds and toasted soy beans.

Dari/Milo

A popular crop grown mostly in the mid western area of the United States. A large percentage of the dari crop is fed to cattle and hogs. The product is high in carbohydrate. Dari is more drought resistant than many other cereal grains. It can
withstand a lack of rain as the plant actually becomes dormant until moisture arrives.
Dari is found in almost all bird mixes, and I a favourite of pigeons, its main varieties are Red Dari and White Dari. It is a grain that contains high levels of carbohydrates and protein.

It is these grains that contain short chain carbohydrates (sugars) and are the first quick release energy that your pigeons will make use of. They contain lower levels of phytinic acid then the seeds so can be used in larger quantities for our mixes.

We generally use more for sprints then long distance because of their high quantity of sugars, for a short distance race you may use 10% white dari and 15% red dari. For longer distance races you would probably lower the white dari to 7.5% of your mix and the red dari to 10%. They also have a good easily digestible fibre content so should be enough to keep your birds digestion going smoothly without dehydrating them.

Rice

Rice is a cereal grain and is a massively important food source for most of the worlds population. It can also be an important food for your pigeons as it like dari, contains a lot of carbohydrate, about 80% of it is in fact carbs.

Usually we use paddy rice for our birds, it contains a lot of Vitamin E and also B vitamins. The rice starch acts as an energy source somewhat between Dari and Corn, it is not instant energy but it kicks in sooner then the 45 minutes or so that corn takes. Rice is an example of a carbohydrate made up only of branched starch molecules, similarly to corn.

Like dari, rice also only contains low levels of phytinic acid so can be used in
larger quantities of your birds diet. You will usually want about 10% of the mix to be paddy rice in a sprint race, and a lower amount of about 5-7.5% in a long distance race.

Peeled white rice is also useful on race day and the day before as it has a lot of easy access carbohydrates that will not dehydrate your pigeons, this is especially useful if it is a hot day for the race.

**Wheat**

This food is low in Saturated Fat, and very low in Cholesterol and Sodium. It is also a good source of Protein, Thiamine, Riboflavin and Potassium, and a very good source of Dietary Fibre, Niacin, Vitamin B6, Iron, Magnesium, Phosphorus, Zinc, Copper, Manganese and Selenium.

Wheat is a grass that is grown throughout the world. There are several types of wheat. Some wheat is planted in the spring for fall harvest, some are planted in the fall for spring harvest. Winter wheat is mostly the white variety, while much of the spring wheat is red. Hard wheat is used for breads whilst soft wheat is used to make pastries. Many wheat by-products are used for livestock feeds.
Garlic

Now what about the use of garlic in racing pigeons? It is a popular, widely used product, but solid, scientific information on its effects in pigeons seems to be scarce. Everything from cloves of garlic to powders, pills and oils are available in health food stores, grocery stores and by companies selling products for pigeons. Are there any real benefits, or are the “benefits” in the eye of the beholder, i.e. the fancier who uses garlic products? Little scientific information for racing pigeons seems to be readily available, but it should be possible to extrapolate information from work done in humans and laboratory animals to pigeons.

Garlic, good both for fending of vampires and also as a healthy addition to your moulting pigeons diet. Firstly and fore mostly, logic based on a number of studies, says that the best source for the good effects of garlic is fresh cloves of garlic. Manufacturing procedures in the preparation of garlic powders, liquids and oils can vary considerable, and since important, active compounds in garlic can be lost very easily when garlic is processed to produce these liquids and powders, etc., it seems best to avoid these products as they may contain few, if any, of the useful compounds in garlic. Further, it is best to crush cloves of garlic and add them directly to drinking water for pigeons, rather than heating or boiling them, to avoid losing a number of key chemicals in the cloves. It can be pressed for its juices at about 5ml per litre of water or just feed in small pieces.

Garlic contains natural antibiotics that work against a great many bad bacteria. It also contains a plethora of other nutrients such as selenium, zinc, nickel, B vitamins, amino acids, salicylic acid, germanium, calcium and phosphorous.

It is the allicin that is the key ingredient to purify the bloodstream and build up the immune system, maintains beautiful feathering & white wattle. It is a natural anti-bacterial, anti-fungul, and anti-inflammatory. (They will not fuss about the taste of the garlic if you use no more then 1 organic clove of garlic per gallon of fresh water).

It helps to increase blood flow and thus helps digestion. It can remove some infestation, help to strengthen the immune system (because of the trace minerals selenium and germanium present in garlic) and its temporary antibiotic effect on disease-producing bacteria, fungi and yeasts, both in the digestive tract and body tissues, works by reducing their numbers during the period that it is in the drinking water. Selenium is known to be important in the normal
development of the immune system while the animal is growing on the uterus. A deficiency of selenium and Vitamin E has a definite adverse effect, because in such deficiencies, the development of immune system is hindered. As a result, the newborn animal or bird may be completely or severely restricted from protecting itself against invading organisms of all kinds.

Whilst garlic is very important to a bird in moult, it can be used any time throughout the year, though garlic is not a pigeon’s favourite food so whilst it can be used whenever, it is best left out of race mixes where diet is paramount.

Whether these effects apply directly to racing pigeons is just not known at this time. However, present evidence from human and laboratory animal work, and the empirical experience of many fanciers, suggest that, when used judiciously, crushed cloves of garlic, used in drinking water, may be a highly useful product in the loft throughout the year, but especially during rearing and the racing season. At present, garlic-based oils, powders and pills are likely much less useful. Possibly newer developments in extracting the active principles of garlic may get around the present problems associated with current methods. Until these problems are solved, fresh cloves of garlic from the grocery store are still the best source of the medicinal properties of garlic.

**Elderberry**

Just a short couple of words on elderberry, these can be very very useful in keeping your birds healthy. Elderberry has been proven to help fight and even cure e.coli, and also keeps the intestines healthy and free from some disorders. Elder blossom can help to clear the airways, making a tea with these can help make sure your birds can get the maximum oxygen into their lungs and muscles.
These are just a couple of points to help you and your birds be healthy and successful!

Algae
This may sound like a food for fish and not birds, but a couple of types of algae can be massively beneficial and are a few groups of nutrients labelled “super foods”

To start we will take a look at Spirulina, a green algae that is largely farmed in Hawaii. It contains a massively high nutritional value and when combined with a pigeons diet can give a great boost in performance.

To cultivate the algae effectively you need large amounts of very pure mineral water and brine, lots of clean air and also lots of sun. This is why Hawaii is a great option for growing the super food.

The value lies in its large amount of chlorophyll (the substance used for photosynthesis). Chlorophyll is a very easily digestible form of protein and contains all essential amino acids. It has over 55 vital nutrients (minerals, enzymes, anti-oxidants, vitamins) in balanced proportions.

It is high in iron that helps produce red blood cells, thus allowing for more oxygen density in the blood, and then better performance.

Spirulina helps to keep the blood and body pure, it naturally clears waste allowing the vital organs to work more effectively and then allows for better energy processing and performance. It stimulates the metabolism of the birds so they can recover quickly and use their energy reserves more effectively.

It has effects that boost the white blood cell count and thus give the pigeons disease resistance, it can fight stress, increase endurance and improve a birds concentration.

If the product is used once a day for a week you will come to notice some dramatic results.

The second algae we will look at is Chlorella, it is a fresh water variety and is
thought to contain even more useful nutrients than spirulina.

It has a higher concentration of chlorophyll then spirulina and test have been done to show that it contains everything that humans ( and thus pigeons ) require to survive healthily.

Chlorella is very rich in B vitamins, as well as iron and calcium. It contains a whopping 60-70% protein, most of which is very digestible. It contains all essential amino acids and another handful of energy giving, substances that can help your birds to success.

I would highly recommended these algae if you can get your hands on them, they are not cheap, but not very expensive and also you will get much more then you paid for as you only need to use small amounts of them.

Oregano
Oregano can become a very useful addition to your fancier food database, its oil can help stimulate bile and enzyme secretion which is great for breaking down these fatty acids, this can help your birds massively at most times of the year. It also has a lot of antibacterial qualities, though it must be used wisely as it will not differentiate between “good” and “bad” bacteria, so you must only use small amounts of the oil.

But if you stick to using it sensibly and only every couple of days, if you use it daily it will seem to work but after some time your birds will get thin as their good intestinal bacteria were not in large enough numbers to break down nutrients well.

Oregano is best used followed by probiotics, these help good bacteria multiply in the intestines. These products are easy to come by, they are the runny yoghurt drinks that leave you feeling loose if you drink too many!
Yeast
Yeast can be very beneficial to your pigeons, the types we use are Brewers yeast and Bakers yeast, they have a healthy supply of B vitamins, digestible amino acids and minerals. Adding this twice a week to your feed can help your birds a lot, especially in the race season. As far as the amino acids go, yeast has a very high biological value, similarly to soy beans high value.

Yeast can have a variety of effects on your birds, the B vitamins help to calm your birds and ensure a perfect metabolism. The amino acids and enzymes help to ensure nutrients are digested properly. Generally Bakers yeast is what you will want to use, this is used by brewers and then brewers yeast is the left over from fermenting alcohol. You can find these live bakers yeasts in a variety of forms; fresh, dried or liquid. Fresh is best found from a baker and then refrigerated, but make sure you use it quickly as its nutritional value will plummet in a weeks time to about half of its original value.

Feed it to the pigeons in the evenings about two times a week and they should be fine ( not any more then daily or else it has been known for the cocks to get the horn on and fly off after hens ).

If you use the dried yeast then just add it to some water or yoghurt to add some moisture.

You must just make sure that the yeast mix is separate from the other feed mixes because if you do not clean it up properly and it gets into sunlight it can become toxic which is not something you want.
Here is a table covering some of the basic nutritional information for the more prominent foods we have just mentioned.

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That about covers it for different foods, but there are still something we should wrap up for diet before we start discussing various mixes.

**Grit**

Grit should also be supplied to keep up a healthy diet, it can help birds get minerals for various bodily functions. It can be mixed with feed to be of use to the birds. Grit helps to provide a good source of calcium which is vital to bone growth and regeneration.

There is a basic need for an insoluble granite grit for grinding grains in the gizzard, plus oyster shell, or calcium rock chips as a source of calcium, in
addition to a wide-ranging loose mineral mix containing salt (to encourage birds to eat the mineral), and once or twice a week, a multivitamin mix in the drinking water. Some fanciers use calcium flour as a source of calcium, but because it is fairly fine, it tends to move out of the gizzard into and through the intestines fairly quickly, so that there may be insufficient absorption of calcium for body needs. A better source of calcium is oyster shell or calcium carbonate chips, which, because of their larger size, are retained for a longer period of time in the gizzard, and can provide a fairly steady supply of calcium to the system.

It should be replaced or at least cleaned daily to keep your pigeons happy and healthy. Oyster shell makes a very good choice for grit as it is very easy to digest and assimilate into the system. Though oyster shell used for laying hens may be too large for pigeons and should be broken into a smaller size with a hammer, etc.

You must make sure you take a good look at the grit mixes you buy though, if they do not contain some sharp larger stones you should look to buy some yourself. (try Thijssen stomach stones for pigeons). These larger stones will help your birds greatly by helping digestion in the gizzard by grinding up foods so they can be more easily digested. When the stones are used up they become round and pass out of the birds systems in their droppings.

Also providing a pick stone or two for your birds can also help them to full fill these various needs (though be wary as the salts in these can give your young birds the squirts! If this happens try taking them away to see if it solves the problem.)

Now before we look at what mixes we can start to use, I think we should take a look at some common diseases that affect pigeons, if we know what causes these ailments, then we can give our birds the proper care and nutrition to cure them.

Disease

Disease may not seem like it is linked to nutrition but you would be surprised at how many can manifest because of malnourishment and deficiencies.

First of all let's take a look at the main illnesses that will cause poor performance with your birds.
Ornithose Complex

This is probably the most common cause of poor performance related to health. I’m not talking about overt respiratory disease where the pigeons are coughing, sneezing, blowing snot on the walls, etc., but subclinical disease. Remember, that a bird’s respiratory system is integrated into its entire body. Any level of infection will greatly hamper performance. In most birds the only signs of mild subclinical infection you see are:

An excess of tears in the eye. When you press on the waddle you will see bubbles form in the corner of the eye. When you put the bird’s beak next to your ear you will hear a distinct “puff” each time it breathes. A bird that is not excited should produce hardly any sound when it breathes. The bacteria lodge in the upper respiratory tract and can be extremely hard to eradicate. Often, infected birds never completely recover. Although their external symptoms may disappear, they can remain carriers for life.

The classic symptoms of respiratory infections include mucous in the throat, open beak, and heavy breathing, rasping or gurgling while breathing. Another symptom is a watery discharge from the eyes, sometimes associated with swelling in the eye area. Other symptoms include discharge from the nasal area, and occasionally air sac swelling or crop swelling as torn air sacs trap air under the skin.

As is usually the case with pigeons, other diseases can quickly manifest themselves when birds are in distress, so other symptoms can occur, such as loose greenish droppings and loss of weight. Most often the only noticeable difference in our birds will be their unwillingness to fly, or their complete failure in the racing events.

Respiratory infections are the most damming to the racing fancier, because many pigeon populations are carriers of the disease in one form or another, and symptoms are sometimes hard to identify. But race results will definitely be diminished. To prevent and control respiratory infections, maintain adequate ventilation, without drafts, in the loft. Keep dust and ammonia levels low, which means not allowing droppings to accumulate. Control dampness and overcrowding. It’s also wise to limit contact with wild birds, since tests have indicated in some areas that as much as 70% of the wild pigeon population is either carrying or is infected with a respiratory disease.

Because sporadic treatment at inadequate levels can cause rapid resistance, it is not wise to treat without effective drugs for the proper duration. Proper quarantining of new birds is a must.
You should treat your race team for 20 days before the season starts and 3 days at the 1st of each week during the race season for respiratory infection. My favourite drug combination is Tylan (2,500 mg./gall) and Doxycycline (750 mg/gall). This is one of two problems that you must practice defensive medicine with while racing. I would typically never recommend using antibiotics without having the disease, but you will pick up respiratory infection in the basket.

**Coccidiosis**

Coccidia is another problem that will really hurt performance. I maintain that you should treat your birds if you have any level of infection. This differs from some of the European vets that treat only if you get a large number of the bug on a faecal check. I disagree for 3 reasons:

Coccidia is shed in cycles. One day there will be a lot in the bird’s faecal and the next day very few. You can get fooled from day to day. Individual birds vary greatly in their level of infection. Unless you are going to check each and every bird on your team you will miss some with large numbers. If you have any coccidia, as the stress of racing and training goes on you will soon have a ton. Coccidiosis is a highly infectious and very common disease caused by a protozoan that infects the intestines of our birds. It is usually present to some degree in all pigeons, but most adult birds have developed enough immunity to the disease to remain healthy. Young pigeons are most often infected, or birds that have been subjected to severe stress (i.e., racing, showing, lack of feed and water, or relocation). Adult birds may become infected from drinking unclean water or from being in contact with moist droppings.

Symptoms of Coccidiosis include little or no desire to eat or drink. Pigeons with Coccidiosis will remain puffed up on perches, and they lack any desire to move, often closing their eyes. Droppings are usually very loose, greenish in colour, and may become very watery. Weight loss is another symptom, and death can occur in young birds.

To prevent Coccidiosis, keep the loft dry and sanitary. Do not allow feed to come into contact with droppings, and regularly disinfect drinkers. Do not allow birds to drink from gutters or mud puddles, and keep the feed and water free from contact with rodents. Always isolate new birds for several weeks, since they are a primary target for the spread of Coccidiosis. Birds returning from a race should be given a preventative treatment shortly after their return, especially if out overnight. Race baskets should be disinfected weekly.
You should treat and keep it under control. Remember, coccidia is not infective when it is first passed in the droppings. It has to sit around for a couple of days first. So, scrape your loft every day and you should have a minimal coccidia problem. Treat with Sulmet (1 tbs./gall). Another great drug is Baycox, if you can get it.

Canker
Canker is caused by the one celled organism that is called trichomonas. You cannot rely on looking for the typical canker lesion of cheese in the mouth as to whether you have the bug or not. Any level of infection (like respiratory) will really hurt performance. You can only diagnose it with throat swabs by a veterinarian. Symptoms in infected birds are a definite reduction in activity, ruffled feathers, loss of weight, increased water intake and diarrhoea. Cheesy yellowish deposits can often be observed in the mouth or throat. In advanced stages, a stringy mucous and putrid odour can be detected in the mouth. Young birds are most susceptible.

To prevent canker, control stress, maintain regular feed and watering schedules, sanitize drinkers regularly, isolate and observe any newly acquired bird for several weeks, and administer an anti-canker drug on a regular basis throughout the year. Veterinary recommendations vary from once every three months to once a month. This will depend upon incidence and susceptibility in your own flock.

You should treat before the season and as with respiratory treat during the season. Two or three days at the first of every other week during the season should do the trick. Use Emtryl(1/4-3/8 tsp./gall) or Ridsol (3/4 tsp/gall). Spartrix also works but must be given individually.

Haemoproteus
This is a blood parasite that is transmitted from bird to bird by pigeon flies. It will cause anaemia and very poor performance. To prevent transmission you must control the pigeon fly, it will not pass from bird to bird just by contact. To treat Haemoproteus if you have it, treat for 2 weeks before the season and 2 days during the week, each week of race season. Use Atabrine at 200mg./gall. The pill form is not available any more, but most pigeon vets can get a generic form of the powder and prepare it for you to use. It initially was very expensive, but now is getting more reasonable.
E. coli

This is a related bacteria to Salmonella and produces the exact same symptoms. It is much more common than salmonella and probably a lot of what people are diagnosing as salmonella based on symptoms alone is actually E. coli infection. You treat E. coli with antibiotics but you should have a culture and sensitivity run before you treat as this bug varies a lot in what drug kills it best. I have made vaccines for some lofts with chronic problems and helped them, but this is not usually needed. E. coli is a big secondary invader and birds that are stressed with worms, coccidia, canker, and other problems tend to be much more susceptible to it. If you have had E. coli problems in the past it is critical that you control all other disease problems to keep it from recurring.

E. coli infection is caused by the bacteria Escherichia coli. This bacteria is very common world wide and is a common inhabitant of the intestinal tract of mammals and some birds. There has been some debate as to whether or not it is a NORMAL inhabitant of pigeons, however, I have found it in the vast majority of lofts that I have checked, many with no symptoms whatsoever of disease related to the organism.

E. Coli has been shown to be the cause of disease in many species of animals, and symptoms vary from species to species. This bacteria has many different “strains” that infect our pigeons that vary immensely in their ability to produce disease. These “strains” are called serotypes and can be differentiated in special laboratories for that purpose. Some serotypes can easily cause disease while others rarely do. The ability to cause disease (pathogenicity) of the various serotypes of E. coli is related to: The ability to produce toxins. Some strains of E. coli produce endotoxins which can produce profound illness. I personally feel that these endotoxins are a big cause of poor performance in some lofts. We will discuss that later. The ability to invade past the intestinal wall and cause infection in other organs. Some E. coli can readily get into the liver, kidney, and other organs producing disease. The ability to overcome the pigeons immune system. Some E. coli serotypes have the ability to avoid some of the pigeons immune defence systems and thus produce disease more readily than other serotypes.

Infection with E. coli can be classified as primary or secondary. Primary infection means that it can produce disease all by itself and indeed some serotypes of this bacteria can do this. However, in my experience, 90% of the infections are secondary. In other words there is some underlying cause for the infection. This cause is usually some form of stress such as a heavy moult, coccidia, adenovirus, canker, intestinal worms, crowding, heavy training, and
poor nutrition. Because 90% of the E.coli problems are secondary, IT IS CRITICAL to look for an underlying cause when E.coli is diagnosed in your birds.

When we diagnose E.coli infection, we usually do so based on a number of symptoms of disease problems. It rarely causes the same signs in every case. In fact, the symptoms that E.coli can cause are essentially the same as those caused by salmonella (paratyphoid). I often become suspicious of E.coli when I start to see various symptoms arise in a person’s loft. The symptoms include:

Enteritis: This is the most common of the problems associated with E.coli and simply is loose droppings. Pigeons that are affected typically have a green diarrhoea and some will vomit. SLOW CROP EMPTYING is a big red flag for E.coli. When infected, a bird’s crop will often still have grain in it from the previous evening (it should be empty). In any event, birds can quickly lose weight and die suddenly with this form. Joint infections: E.coli like salmonella, can cause joint infections. This results in lameness or a dropped wing. Swelling may or may not be seen in the affected joint. If this occurs, it is critical to treat quickly to prevent permanent damage from occurring.

Sudden death:
Sudden death in any age bird, often with no previous sign is common with E.coli (and salmonella). This is due to a sudden overwhelming infection (septicaemia). This massive infection with its toxin production will kill a bird very quickly. In my practice one of the most common things I see with E.coli infection is the sudden death of apparently fat healthy youngsters about banding age. These youngsters will be full of food and just dead for no apparent reason. If I culture almost any organ from one of these dead youngsters I will get a high number of E.coli. The age coincides with the decrease in immunity that they received from the egg and crop milk. Fertility problems: Although E.coli can cause fertility problems in both sexes, the hen will often spread out and appear to be ready to lay, but never actually lays. Some will go ahead and lay but the eggs will be soft, rough, or small. Eggs that are fertile will often die once incubation has progressed a few days. When we culture these eggs we will grow the organism. Sometimes youngsters will fully develop and simply not be able to hatch. When I have had a hen with E.coli problems I have found it extremely hard to completely “cure” them. They often have problems each year. If you have a good hen with E.coli problems I would recommend that you have the droppings cultured (it will yield the same bug as in the oviduct) and determine which antibiotics work for the serotype in her. Place her on that antibiotic several days before mating up and throughout the time before she
lays. This often results in healthy, fertile eggs that hatch with no problem.

Respiratory infection: The bacteria can infect the respiratory tract along with the other typical causes of respiratory infection such as herpes virus, mycoplasma, chlamydia, and other bacteria. E.coli is NOT a normal inhabitant of the respiratory tract of a bird, whenever it is found there it is a sign of infection and must be treated.

Symptoms of this type of infection are usually the same as pretty severe respiratory infection from other causes, exercise intolerance, open mouthed breathing, rattles, etc. Paralysis: One will often find a bird in the loft laying on the floor unable to use it’s legs, appearing paralysed. This can be due to an overwhelming infection (septicaemia) or actual infection of the nervous system. It is a serious sign, and typical of E.coli or salmonella, and must be treated quickly as death is near for these birds. Poor performance: This symptom is one that I am beginning to consider a big one in many lofts. Now remember, this one is MY OPINION ONLY, and has certainly not been shown by any experimental evidence. We know that E.coli is a TOXIN producer, some serotypes more than others. These toxins can make birds sick in large amounts, but I feel many birds have a level of infection that doesn’t make them terribly sick, but does cause them to perform poorly. I have seen several lofts that have had performance problems and in general the only thing we could find wrong was a high level of E. coli in the droppings and no other symptoms related to E. coli infection. Now these lofts are All American and President’s Cup winners, they know how to fly, lest you think the problem is the handler. When we treated with the proper antibiotic, performance dramatically improved, but when the antibiotic was stopped, performance dropped again in a week or so. On reculture the E. coli level was high again. My theory is that the way we fly pigeons today tends to predispose them to E. coli overgrowth because of:

Stress: We see this especially in young birds. We train them daily, race them weekly, expect them to moult, etc. Other diseases: All of the other bugs we see such as canker, coccidia, worms, etc., predispose to E. coli infection.

Medication: All of the medication that we use to control the other diseases really takes a toll on the normal flora in our birds intestine, thus predisposing to E. coli overgrowth.

The fact that antibiotic therapy for the E. coli greatly improved performance made me think that by controlling the E. coli level we might be onto something. So, in several lofts I made them an autogenous vaccine of E. coli (one from the serotype found in their birds) and we had them vaccinated. In almost every case, performance dramatically improved to championship levels and we didn’t
need to use near the antibiotics that we had previously. Once again, none of this was done with the accepted scientific method, but from my observations this could be a real key for some lofts.

When we diagnose E. coli it is critical to remember that we can not do it on symptoms alone, as other bacteria, especially salmonella, cause identical symptoms. When we suspect the bug we culture the droppings and organs of an infected pigeon. When found, we run a SENSITIVITY test to determine which antibiotic will work on the serotype found. THIS IS CRITICAL AS E. COLI VARIES TREMENDOUSLY AS TO WHICH ANTIBIOTIC KILL IT. IT DEVELOPS RESISTANCE VERY QUICKLY TO ANTIBIOTICS AND YOU SHOULD NEVER ASSUME THAT WHAT WORKED ONE TIME WILL WORK THE NEXT TIME.

Treatment involves three areas: Antibiotics used for 7-10 days: It is critical to have sensitivity tests done as we pointed out earlier, THIS BACTERIA IS RESISTANT TO MANY DRUGS. The common antibiotics I often find that work in many cases are:

Amoxicillin: 1500-3000 mg/gall.
Baytril or Cipro: 250 mg/gall for Baytril and 750 mg/gall for Cipro. Do not use during the breeding season in breeders.
Primor: 30 mg/bird per day in the water.
Bactrim: 30-60 mg/gall
Cephalexin: 2500-3000 mg/gall Treatment of the underlying cause: If you do not get rid of the underlying causes that are causing the E. coli to show up, it will soon be back. Make sure you control the things mentioned previously.
Vaccination: This has been extremely helpful for some lofts and has really boosted their performance. It may be the treatment of choice in the future, the jury is still out.

Using a Veterinarian

If you remember back to part one we discussed how critical it was to keep our birds in “SUPER HEALTH” not just apparently healthy as most of us do. Organisms that cause canker, coccidia, respiratory disease, etc. can be present in our birds, greatly hampering our performance, yet the birds still look and act good. The only way to know if you have coccidia, worms. Trichomonas (canker) and haemoproteus is to have faecals, throat swabs and blood smears.
done. For all practical purposes it is easier to have a veterinarian do it for you. If you monitor and control these problems before and during the race and breeding seasons, you will be way ahead of the game and can achieve that “SUPER HEALTH”. Using a veterinarian gives you many advantages including:

You will know if you have a problem. You will not treat needlessly. You will know the proper drug to use. You will know the proper dosage of the drug. You will know how long to treat. It will cost less money by far in the long run.

Giving Your Birds a Fighting Chance

Well hopefully you were able to get a good grasp on those illnesses and how to spot them, now I shall give you some information on the nutrition we can give our birds to try and lower the chance for disease to appear in the first place.

Here are some measures you can take to keep your birds healthy; make sure they have a healthy ratio of twice the Omega 3 fatty acids as Omega 6 fatty acids, this will help your birds immune system stay strong and can be achieved through a good balance of fatty seeds such as flax, rapeseed, cabbage but also not overdoing seeds like sunflower and safflower as they do not have the right balance of omega oils. Have a good Vitamin A content in your birds diets, this can be obtained through adding spinach and carrot to your mix, or even just giving your birds dilute carrot juice to drink.

Garlic, the almost wonder food we talked about previously. It contains allicin that works to build up your pigeons immune system and combined with the germanium and selenium minerals it contains that also help to bolster white blood cell count, garlic is a very good additive.

You should also not try to restrict calories to your birds, even if it is so they are lighter for a race, this lowers their immune system and puts their bodies under stress leaving them more susceptible to illness.

And finally just a general good supply of minerals through good grit, a pick stone and mineral supplements if they are needs.
Various Mixes

Now we are going to take some time to look over various mixes for our birds, these will cover seasons and weather so you should be well prepared for anything to pop up.

So let's get started with a Breeding Mix.

Breeding Mix

Briefly, proteins are used in the building and repair of tissues in the body, and so are useful in preparing pigeons for the breeding season, for improved fertility and hatch-ability, and for improved growth and development of youngsters. For example, studies in the USA have shown that an 18% protein ration, in which soy beans or fish meal were used as sources of protein, resulted in marked improvements in all of the situations just mentioned. No further improvement was found when diets containing higher than 18% protein were fed, so it seems that diets containing upwards of 18% protein are ideal for breeding and rearing.

Breeding mixes can be the hardest things to get right, firstly they generally revolve around protein, though as we have discussed previously, legumes and protein can and should be separated from each other in meaning.

In fact in a breeding mix I recommended almost no legumes as their protein can be very hard to digest, now for a newborn swapping from crop milk to solid foods you want to make sure it is as easily digestible as possible.

Because young birds continue to grow and develop for many months, I believe that they should be maintained on the ration on which they were reared, or on one similar to it. As they begin to train and race, they can have more grains high in carbohydrate and fat for the energy they provide.

Three to four weeks ahead of pairing birds, increase the percentage of easy to digest proteins, plus a high-protein pellet (18-28% protein) which also contains a broad range of vitamins and minerals. A non-medicated pellet, such as an 18% protein finisher pellet prepared for broiler chickens, or a 28% protein turkey pellet are examples of useful pellets. I use a 28% protein pellet called Milk Plus produced by Cargill (Nutrena Feeds). Aim for a final protein level of 17-18% which is ideal for fertility, hatch-ability, growth and development of youngsters.

The reason for the 3-4 week interval before pairing the birds is to ensure that the systems of both sexes are well fortified with all of the nutrients that are important for high fertility, etc., as just mentioned. Too often, in my experience,
before the breeding season fanciers don’t change from a relatively bland off-season diet to one higher in a range of important nutrients, until after the eggs are laid. One problem with this can be clear eggs, or at hatching, weak or dead-in-shell youngsters. To avoid this situation, improve the diet ahead of the breeding season, much as sheep breeders do when they “flush” their breeding animals by putting them on a higher plane of nutrition, e.g., higher levels of protein, plus vitamins and minerals ahead of the breeding season. )Note that black eggs, or dead-in-shell or weak youngsters can be the result of bacterial infections in the egg, i.e., E.coli and paratyphoid infections, etc., If this is a persistent problem, be sure to take some of these eggs or youngsters to your veterinarian for bacterial culture.)

Whilst there is one are for you to keep an eye on, legumes tend to contain high amounts of calcium and fatty seeds do not, so just make sure you have readily available grit with a lot salt content so your birds can stay happy and squirt free.

Vitamin E is a good idea to include in your breeding mix as it can increase fertility, producing healthier sperm and helping ovary regulation.

Hemp should make up a good proportion of your mix as it contains a lot of easily digestible proteins unlike peas and beans. Barley can be a good additive as its fibre content helps to clear the birds systems ( it is not unusual for 75% of a breeding mix to be made up of fibre rich seeds).

Corn should generally be left from your breeding mixes, even if you do add it you will find yourself sweeping it up come spring as the birds wont take much of it, this is because they need protein not a load of long branched carbohydrates.

Soy beans can make a small portion of a mix as they contain all essential amino acids, but these are not to be overdone. These breeding mixes require a high amount of Omega 3 fatty acids to give the youngsters the best chance in life, fatty seeds like flax contain high proportions of these, also spirulina and chlorella are very good ideas to include for the massive amount of reasons listed previously.

Finally you need to try and not give them too much of a good thing, if you give pigeons more then they need for balance they even tend to go outside and eat dirt and other low nutritional substances to try and balance their diets out.

So if you try to keep your breeding mixes to about a 15% legume count and account for the rest with the other substances mentioned you can produce some phenomenal offspring. Combine this with the little and often feeding principal
to increase digestibility and you will find healthier more muscular birds are just a stones throw away.

**Moult Mix**

Now to the moult mix, a lot of this will concentrate on giving your birds the best nutrients for them to grow good feathers, good feathers equals a better race performance. Okay so I will just give a run down of some minerals needed for your moult mix to contain; sodium, potassium, calcium, chromium, phosphorous, magnesium, molybdenum, silica for stable feathers and sulphur to produce feathers.

Controlling the moult in youngsters is a real “key” in winning today. Youngsters that are moulting heavy in the body, head or neck just cannot come into good form during the season. By raising early youngsters this is not a problem for me since we start racing in September. Most of my youngsters are completely through the moult by the time the race season starts. This is one of the main things that all of the “light” systems do that you see advertised.

I believe that next year’s races are won, in part, during the current moult in which nutritional demands are very high to complete the annual change of feathers. For this reason, the diet should be one that supports the high demand for the quality of protein needed for the growth of quality feathering. Proteins are comprised of smaller units called amino acids, of which there are some 22. Those amino acids containing sulphur, especially cysteine and methionine, are key to good development and growth of feathers. A very good short article from Melvyn John of Vydex Animal Health in the British Homing World weekly for October 6/00, explains the need for high quality protein during the moult. The author feels that ordinary grains in pigeon rations will not supply enough of the much needed cysteine and methionine, and so recommends supplementation on a daily basis. Commercially available amino acid solutions can help, but also, supplements containing fish meal, for example, in pelleted feeds, can be useful here. The author also recommends vitamin (especially vitamin C) and mineral supplementation during the moult.

So to get started on the foods, flax seed is a good idea for a moult mix (though not too much because of their prussic acid content), flax helps to give birds lovely shining feathers and can be administered easily in the form of flax tea that we covered earlier.
Cabbage seeds and rapeseed are also good additions to your mix as they grow fast and absorb a lot of sulphur and contain cysteine, sulphur and cysteine are both important components of keratin which is the main protein used in feathers. Corn content can remain low for a moult mix, even lower than a breeding mix in fact as these carbohydrates are just not needed in quantity. Peanuts are a good addition as they contain high quality amino acids and it is there proteins that are essential to good feathers.

Soy bean is another important ingredient as they have all essential amino acids and contain high amounts of unsaturated fats.

Moult ing puts a lot of stress on birds and can leave them weakened so you should make sure that you give them a lot of sunlight, air and regular baths. Pigeons love taking baths, especially the young. I offer mine at least a couple clean cat litter tubs of water a few days a week. Add a little bath salts to the water if you like!

Also in the diet a good amount of wheat is important, as well as foods such as stinging nettles for Vitamin A, kale for iron and calcium and onion for Vitamin B6, folic acid, Vitamin C, calcium and magnesium.

Basically the rule during the moult is protein rich, fat rich, fibre rich and keep it varied.

Racing Mix

Now we get into the real detail about our mixes, this is generally what all other nutrition through the year has been coming together to perfect so this last bit can be what wins it for you.

So to start we will go over the carbohydrates in activation order, so firstly we need white and red dari, these contain very short chain carbohydrates that give the pigeon instant energy and glucose boosts to stock up the birds glycogen reserves. In a sprint mix there should be about 15% red dari and 10% white dari, this large proportion goes to show how essential these first few minutes can be to a race. Another quick access proponent of our mix is peeled white rice, this should be fed to your birds on the race day and the day before, it too gives a lot of quick and medium access sugars and retains a lot of moisture so will keep your birds hydrated. Barley is another example of a quick access carbohydrate, it supplies its energy in the first 10 to 20 minutes of the race and should comprise about 5% of any race mix.

Some medium access carbohydrates are seeds like safflower and sunflower,
these are short usually branched carbohydrates that give the birds energy between 20 and 45 minutes into the race. I suggest using about 2.5% of each seed in your mix.

Now onto a large portion of most race mixes, corn. Corn can be a wonderful substance if used correctly, it contains a huge amount of long branched starch molecules and will give your birds energy between about 45 and 60 minutes into the race. I suggest adding about 30% corn for a sprint mix and about 35% for a long distance race, this will help your bird carry on without loosing speed too much when it changes over to its fatty acid reserves.

Now were are onto the fats reserves, you should feed your birds a lot of fats until about two or three days before the race, this allows the fatty acids to reach the red muscle fibre and settle there for storage, any fats after this will remain in the blood for use before the muscle stored fats.

Flax seeds and rapeseed should be used as a great source of omega fatty acids, they are easy to access and as long as you do not use too much they are very useful, I suggest about 3% of each. Peanuts should also be given a couple of days before the race as they contain highly digestible fats that will be of a lot of use to your birds in a long distance race, just a couple of peanuts a day in the week leading up to a race should do the job. Bakers yeast should be fed to your birds once or twice a week before a race as they contain amino acids with very high biological value, making them very useful if your pigeons fat reserves start to drop.

You must be careful when adding high fat, high protein foods such as peanut and sunflower seed though. If these high-fat, high protein grains are added to the ration, be sure that there are also lots of high-carbohydrate grains present, as well- such as wheat, corn, rice, oats, etc.. High fat, high -protein grains can interfere with fat production by the liver, but if a lot of high-carbohydrate grains are fed at the same time, interference with fat production by the liver doesn’t seem to be a problem (the glycogen system we mentioned earlier in the report). Some fanciers even feed 80-100% corn plus some peanuts or sunflower seeds on the last 2-3 days before shipping to a long race.

Finally when your birds have used the fatty acids in their blood and red muscle fibre, and also started to use up their fat reserves, the last thing you want to happen is for them to start breaking down their muscles so you should make sure you include some of these in its diet a couple of days before a long distance race; Hemp, hemp contains some very easy to digest proteins that can be accessed by your birds in an emergency, Soy, soy beans provide a full
spectrum of proteins and are very digestible and useful, they should make up about 5% of a mix and also Chlorella and Spirulina are something to definitely think about for a race as they contain a vast amount of nutrients, not to mention incredibly digestible proteins and fats.

It is also evident that the level of peas in rations for racing is reduced, but not eliminated. Peas and other high protein grains are reduced in amount and are replaced by greater reliance on grains high in carbohydrates for the racing energy they contain. Peas are just not an energy feed, but as noted, their protein is important for the repair of damaged or degenerated muscle or other tissues. Some damage or degeneration may occur during any race, but logically seems more likely if a race is tough and birds are forced to work extra hard, so some protein should be present in the diet to be used in the repair process.

In addition, we have seen that high levels of protein in a ration will decrease the amount of fat the liver is able to produce. Why in the world would we want to decrease fat production ahead of any race, since it is the chief fuel for sustained, rapid flight? The emphasis in preparing birds for racing should be a decreased reliance on high protein grains, but a much increased reliance on the high carbohydrate grains (and at some stage, depending on the distance for which we are preparing birds, an increase in some of the high fat grains for a few days).

Before a race you should make sure your pigeons have a source of Vitamin B12, this will help to activate its metabolism and get its body ready to race, also the peanut you have been feeding the birds will have helped to start the metabolic fires burning.

Ground lecithin is a good idea, especially for long distance races as it emulsifies fats so they can be absorbed into the muscles for use when needed, if you feed this to your birds for about a week before a race they should be good. Oregano is also helpful as it stimulates bile production which will do the same job as lecithin to break down fatty acids for storage, but make sure you only use oregano once or twice a week because of its antibacterial effects.

Electrolytes should be given to your birds for a day or two before a race to get salt levels high and help the birds retain water, though on the race day make sure you only give your birds pure fresh spring water.

Also if you decide you want to then I would recommend carnitine, if you feed it to your birds for about three or four weeks before hand in the dosage mentioned earlier it will improve their performance allowing higher speeds to be retained.
for longer time periods. It allows more efficient burning of fats so as competitors start to drop down to lower speeds as they move their energy system, your birds will be able to retain a higher speed and pull ahead.

Fanciers have asked about the amounts to be fed per bird during the race season. It seems that in birds, hand feeding a given amount each day results in a greater production of fat for fuel than does open hopper feeding. For the shorter races, somewhere in the area of 1 ounce per bird per day seems adequate. As the distances get beyond 250 miles, perhaps 1.25 ounces per day, and beyond 200-350 miles, 1.5 ounce per day. On some days, birds will need a bit more if they appear extra hungry for some reason, and on other days, they may need a bit less, but over all, it is still a judgement call by the fancier.

In all cases, birds should remain buoyant and light in the hand, and as form approaches, they should balloon out to appear larger in the hand, but continuing to be as light as feathers. Wattles should be sharply white, or even pink, as circulation improves with improving condition. The eyes should sparkle like diamonds, feathers should be tight and smooth, the breast muscles pink, and the skin clear and free of scales, with tiny blood vessels clearly crossing the keel.

So I think that should be enough to think about as far as race mixes go!

Dried Seed Mixes

A mix that many fanciers have praised both past and present is a dry seed mix, I will now take the time to highlight some of the bonuses and deficiencies involved in such a mix.

An important consideration in the feeding of grain is the annual harvest. Seeds grow in spring and are harvested once a year, leading to a cycle of progressively older seeds until the next harvest. At some time during the year, at least a portion of the seeds are one year old or older.

The nutrients that are most affected by ageing are the vitamins, which lose activity owing to oxidation and fats, which become rancid. This ageing process can lead to a reduced nutrient concentration. In this way, the level of many other micro-nutrients becomes reduced with time. This reduction can be limited by reducing temperature and oxygen in the storage environment. This can be achieved by filling bins to the brim with grain before sealing the lids with tape and storing the whole drum in a cool place. Often, despite these measures, micro-nutrient levels become low. To guard against deficiency, a complete water-soluble multivitamin drink can be made available to the birds periodically.
(e.g. Multivite Plus) and pink mineral should be always available.

It is not only vital for race form to be achieved that the diet provide the birds with all the nutrients that they require but that it also supplies protein and fat at the correct levels. All seed diets tend to be high in fat but low in protein. This can result in obesity as the birds eat to meet both their energy and protein requirements. The correct level of protein in the diet of a racing pigeon during the racing season is approximately 12% and the correct level of fat is approximately 4%. There are many varied diets recommended and some of these provide significantly different levels of fat and protein. These appear fine in the short term but for long-term health the average level in the diet should approximate the above. The various diets have been discussed in my book, The Flying Vet’s Pigeon Health & Management. If the protein level in the diet is too low, normal enzyme and hormone activity cannot occur, healing and recovery are delayed, and muscle, bone and feather growth cannot occur normally. If the diet is too high in protein, this places an increased workload on the kidneys, which can be fatal. In one case at my clinic, stock pigeons started dying. Investigation revealed that they had died of kidney failure. The fancier had fed turkey pellets only (30% protein) for over 6 months.

Excess fat in the diet leads to obesity, while, because fats are needed as an energy source, too low levels of fat lead to weight loss, poor growth and reduced disease resistance.

Many successful fanciers will already recognize supplements as being beneficial and the following are recommended:

Complete multivitamin/trace element drink made specifically for pigeons at least one day per week in the drinking water (e.g. Multivite Plus)

Pink mineral and balanced grit (containing both hard and soft grits) always available (e.g. PVM powder and The Australian Pigeon Company’s Health Grit)

Wheat germ oil-based supplements together with yeast on seed for two or more feeds weekly (e.g. Polyseed Oil)

Chopped green vegetables with diced carrot weekly (or carrot juice diluted in water one day weekly)
Other supplements can have other advantages. Some of the teas commercially available not only contain micro-nutrients but also naturally occurring acids that help to protect the bowel from disease. It should be noted that there is no point in providing the correct blend of seeds if birds are then fed these cafeteria-style. It is a fallacy to think that pigeons know what they need and will only eat what they require. Many birds, if offered a blend, will over-select particular grains that they fancy, in particular oil-based grains such as safflower and peanuts. The selection of a smaller number of grains distorts the provided balanced diet. In addition a diet that contains excessive oil-based seeds although providing a reasonable protein intake also provides a lot of fat which distorts the amino acid balance.

Such a diet is also very low in calcium and can interfere with the absorption of fat-soluble vitamins. A poor diet means that birds are more prone to disease, poor feathering, poor reproductive performance and, of course, poor racing performance. The provision of a complete and balanced diet will optimize the performance of the competitive bird.

**Hot weather mixes**

I just want to take the time to go over some changes you can make to your feed depending on the temperature and/or time of year. Sorry if I end up repeating opposites of summer and winter but it should help enforce the point.

To start you will tend to find that your birds will leave more corn in the hotter summer months, this is because as we know corn contains a lot of slow burning branched carbohydrates, and the birds do not want to eat anything else that is going to heat them up.

Electrolytes are also a lot more important when the weather get hotter, these electrolytes allow your birds to retain water and thus keep hydrated. Dehydration can be a pigeons worst enemy, as we know from studies a drop of only a couple of percent in a humans water levels can cause a whole series of nasty side effects, this dehydration works exactly the same for pigeons so you will want to make sure you give birds electrolytes before hot races, and then pure water on the race day because the salts in electrolytes dehydrate, but allow water to be stored over a couple of days. So in the end are beneficial.

Peeled white rice is also good for a hot race as it retains a lot of moisture, to test this simply put some peeled white rice and some paddy rice in water, an hour or so later the paddy rice will be the same where as the white rice should be bloated with water. This water retention helps to store moisture for races when
the birds need it.

Some protein also appears to be necessary as a source of uric acid which, it seems, may be useful in preventing or reducing the effects of hyperthermia (over heating) during races, especially those flown in very hot weather.

When it is hot you should replace a lot of legumes in a mix with high fat seeds, the fats in these seeds are easier to digest and thus drain less water from the body, this helps to keep your birds hydrated.

**Cold Weather Mixes**

Well as stated before, you take away corn when its hot, the opposite applies when its cold. Corn creates heat for sustained periods of time when it is digested so therefore it is a good idea to increase the amount of it you are feeding your birds when it gets chilly ( unless you want to buy them all little coats and scarves).

A good fatty acid profile can help to give heat retention, some farmers in cold weather climates feed their horses sheep fat which keeps them warm at colder temperatures, this is because it contains a lot of fatty acids. This just goes to show that upping the intake of these fats is a must during winter months. This fat will be more readily stored during the winter as it works to insulate and warm the birds much like your wall filling and double glazing does in your house.

In a winter mix you want more fat and carbohydrates and less proteins, so removing peas and legumes is a good idea. In the winter the is little need for protein as it rebuilds, your bird does not really need to rebuild muscles, it just needs to get fat and keep warm!

I also recommend a high amount of fibre for a while to help cleanse the intestines from all the race and moulting indulgence. If the intestines are covered in old food, then new nutrients will have a hard time being absorbed and you need these fats to get stockpiles as quick as possible.

That is that as far as general mixes go, now you should not take my word as law, but it goes give you a good overview of what to include and when so hopefully you will find this useful.

I will not go to just talk about different feeds depending on how long a bird will be in a basket before a race.
Basket Nutrients

It is very important to judge a bird’s last few meals before a race by how long they will remain in the basket, there is no point giving them a load of sugars if they will be in a cage for three days as they will already have started to use their fat reserves up.

During the last week before shipping, it is the philosophy of some successful fanciers that toward shipping day, especially for the longer races, the amount of heavy exercise/training should decrease, and the amount of feed should correspondingly increase. This seems to make a lot of sense. Why build up fat reserves for the race, especially a long race, if you are just going to burn it all off by training during the few days before shipping, thereby alternately building fuel reserves (fats) on the one hand, and then burning them off through excessive work, on the other hand? It’s something to think about. It would be like fuelling the car for a long trip, only to use most of that fuel by driving around town at high speed, before leaving on that long trip. Result: the tank is empty or low in fuel, and more fuel is now needed to handle that long trip.

Another point: I think it is important not to ship birds to a race with a full crop of feed. If we have been feeding the birds correctly up to shipping day, by that time they should be well prepared nutritionally, so it’s really not necessary to pack them with feed late in the afternoon of shipping day. Loading the birds with feed simply invites unwanted thirst, and if they don’t know how to drink in the transport truck, or if water isn’t provided, birds will suffer unnecessarily. As well, it has been found that birds kept off feed for up to 72 hours load their breast muscles with fat, so if they don’t get a good feed late on shipping day, there should be no further concern about them, as long as they have been well nurtured up to that point.

A few more points—birds should generally be fed in the transport truck late afternoon of the day before release, and the feeders removed before nightfall. Definitely they should not be fed on the morning of release, again because of the problem with unnecessary thirst during the race. The birds should be watered the night before and on the morning of release, without fail. (Fanciers also need to teach their youngsters how to drink in the transport truck.)
It’s likely a contentious point, but the amount and kind of feed to provide in the transport truck is also important. Birds likely don’t need more feed than about 0.5 - 1 ounce (maximum) per bird the night before release. For a holdover, likely 1 ounce per bird per day is enough—remember, these birds should have been well prepared nutritionally, well before they were shipped!

Based on the facts, the grains to be fed in the transport truck should be the cereal grains only—corn, wheat, rice, etc.. In many cases, the main feed given is straight corn, which is just fine. The birds need the energy grains just mentioned, but not peas. (They likely won’t eat many of them anyway, as long as they have the choice of cereal grains, the most desirable feed.) As mentioned a number of times now peas are not an energy feed, and the birds need energy for the race ahead—hence, the value of the cereal grains, especially corn, to help accomplish this.

One night in the basket
If your birds are only going to be in a basket for one night then their crops should not contain any food, instead all food should be digesting away in the intestines. Doing this will allow all energy to be devoted to flying the next day instead of energy and moisture being sapped for digestion. Your final mix should not contain peas and should be high in energy, this can be achieved with rice and dari, also corn can be added (in higher quantities if the weather is cold). If you feed until the pigeons do not want to eat on shipping day, you should be good on race day.

Two nights in the basket
Pigeons should have a half crop of food for two nights in the basket, this will give them time to let the food pass to the digestive system and supply them with energy and still end up with food all digested by the time they start the race. Your mix should be part racing mix, and part energy mix. If you feed just before shipping you can give the birds some dari and rice high energy mix (without peas) and also give them water to stimulate their metabolism. Your birds should only be fed normal amounts because if you stuff them they will want to eat again in their baskets because their metabolisms will be burning too fast. Corn can be useful as it will give the bird lasting energy for the day if it is just staying in its basket.
Three or more days

This can be tricky as you need your birds to be digesting for the entire length of the basket stay as they will start to degenerate if not. Hopefully for longer stays the shipping companies will be able to offer the birds corn and easily digestible mixes. The mix you give your bird can contain corn and your race mix with a high energy mix thrown in, this an sufficient water is vital for digestion.

And that should be all we have to talk about!

I hope very much that you have enjoyed reading and learned some valuable information about the beautiful racing pigeon sport.

Thank you very much

-Chris

Some information and research has been made public by Dr. A Chalmers, Dr. Colin Walker, Dr. Rob Marshall, Dr. John George, Dr. Steive Weir that I have used in the creation of this ebook, and because of this I would like to thank them for their time and contribution to the sport.