Developments in Feeding

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Can we measure energy? (Part 1)

When we go to the city for the day or a weekend, we make sure that we are well prepared for the trip. We take a coat, our wallet, perhaps a camera and an umbrella, just in case. We also make sure the car is ready. We fill the gas tank and make sure the ownership and insurance cards are in the glove compartment, prepared for any eventuality.

If the return trip is 250 kilometres and we get 10 km to one litre of fuel then we know we need 25 litres in the tank to make the trip. Otherwise we will have to stop along the way to add some fuel to the tank in order to get home.

You are probably thinking, what does this have to do with pigeon racing? Well, everything. Our pigeons are also prepared for a flight each week. On the short races (Vitesse) we feed a little lighter and less then for the middle distance (Midfond) and for the long races (Fond) usually peanuts are fed, in order to give the birds more energy. But, are we giving them enough? How we feed them is often a matter of, it feels right.

The top fanciers know from experience what works. But, always there is that question in the back of your mind, “Did I get it right?” What will happen if the wind shifts? To-day, we seek more information and we are justified in asking; has there been research done on the energy requirements of pigeons during flight? Protein, carbohydrates (sugars) or fats? What do we know about them? To date, research has been done at different universities (Guelph in Ontario, Canada and Gent in Belgium).

Presently there are some interesting tests being done with pigeons, which were fitted with a transmitter on their backs. Just before they are released an antenna is attached to the transmitter and these birds can be followed via satellite. It will probably soon be technically possible to follow the flight path of the bird via the Internet. From the use of these transmitters, we will learn many interesting facts in the near future. This field is still in its infancy. I think presently the transmitters are still too heavy to give us realistic and reliable information.

We still have to rely on what we know presently. Meanwhile, science has not stood still. At the University of Gent pigeons were tested in wind tunnels. The pigeons were fitted with the needed hardware and flew into the wind without being able to fly ahead one meter. By attaching a mask over the birds beak (see photo) the exhaled breath could be collected to determine precisely what the bird used. These birds had to first learn how to fly in the wind tunnel.

The results were interesting. It turned out, that pigeons during the first 10 minutes used practically all of their carbohydrate reserves. They used them to reach height and speed. These carbohydrates (glycogen or mono-sacharide) are stored in the white muscle and are directly available. When these carbohydrates are used up, then for the next +/- 50 minutes the fats that are in body (blood) are used.

These so called “blood fats” were on the way to the red muscles fibers to be stored as fat reserves. These red muscles fibers contain +/- 97 ½% unsaturated fatty acids. This is the fuel for the trip home. The “light blood fats” in the body are manufactured from the carbohydrate and fat rich grains that were fed at the last 3 meals. If after 1 hour this fuel is used up, then gradually the fuel used is changed to the fat reserves stored in the red muscle fibers.

A pigeon uses during flight 3 to 3.5 grams of fat per hour. The exact amount depends on the difficulty of the flight and on the efficiency of the particular pigeons system. For example, there are body builders with heavy thick muscles and there are marathon runners who have long thin muscles. The former use energy more efficiently. Now that we know exactly how much energy a pigeon uses per hour of flight, can we, if we know how much fat our feed contains, calculate how much a pigeon needs?

Example: Let’s suppose your pigeons were being entered for Orleans, and that the race would normally take 6 hours of flying for our pigeons. As just mentioned the pigeons use carbohydrates as the fuel to fly for the first hour. The last 5 hours the fat reserves in the red muscle fibers are used as fuel. Let’s use an average of 3.0 grams of per hour.

The birds therefore need 5 X 3.0 grams = 15 grams of fat stored in the red muscle fiber. If we know how the fat content of our feed, we can calculate if this feed is high enough in energy. If we have a feed with 5% fat and we feed on average 200 gram of feed per bird per week, then we have given the pigeon 10 gram of fat reserves, which is not enough for this race.

If we had a feed with 9% fat (=18 gram of fat) then it is too rich for this flight. Statements such as: “this feed has the ideal fat content”, are relative. Naturally we can make a feed lower energy mix by adding a diet mix with a 3% fat content. We will always have to keep in mind the total hours on the wing we expect for the upcoming flight

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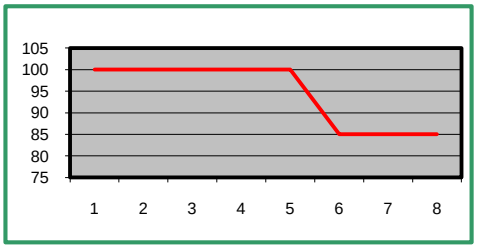
A good widowhood mix has a high fat content, a high usable energy content (carbohydrate and fat) and relatively low legume content. If these amounts are not provided on the bag, then they are likely obtainable from the manufacturers literature. Loading up with too much fuel is not suggested. The fat depots will eventually overfill and the pigeon will lose form.

The pigeon has to carry the extra weight and this will require extra wing beats to keep the pigeon in the air. A Formula 1race car driver wouldn't think of filling his fuel tank for the last 5 laps of a race. The car would be too heavy and slow. Costly seconds would be lost. Too much slows the birds down and not enough can have catastrophic consequences for our racing pigeons. Most of the mistakes are made by the pigeon fancier not the pigeon.

When all the birds' energy reserves are used up, a bird with character and guts will keep flying and start converting its own protein into energy. This is coupled with enormous consequences. The pigeon literally burns up its own body (organs and muscles etc.). These birds usually are never able to perform to their previous standards.

For short sprint (Vitesse) races carbohydrates (glycogen) are much more important than for long distance (fond) races. Results of tests show that while flying on glycogen and carbohydrates (fats) in the blood stream and those stored in the liver, the pigeon can obtain higher speeds. This can be seen on the chart below. In this example the pigeon obtains a speed of 100 km per hour during the first hour of flight. After that the speed drops down to +/- 85 km per hour. This is the speed of flight obtained while burning the fats in the red muscle fibers.



Ten minutes longer flying on energy from carbohydrates means a 2-½ km lead. This lead during a sprint race is impossible to overcome. This of course is all theory. Pigeons are not horses that run their race around a racetrack. They can't (not yet) be followed. Many things can happen on the way home.

An optimal orientation, the release, the wind, the list goes on, all play a role. But, on sprint races of 250 to 300 km, if we can increase the glycogen reserves and increase the amount of blood fats, surely it is worth the effort. From research on the use of carnitine it was discovered, that pigeons at about the 400 Km mark had a drop in speed because the muscles were tired. The term used in other athletic events "they hit the wall" comes to mind. After awhile the birds recovered and could keep flying at a decent tempo. The last kilometres as you can see are the hardest and the speed will gradually decrease.

On longer races the fat reserves become much more important fuel supply. Unlike the bike riders taking part in the "Tour de France" birds cannot eat or drink on the way, or rather this is what we want to overcome. They cannot replenish their glycogen reserves and become dependent on the reserves stored in their bodies. Besides fuel the pigeons also need oxygen. Muscles cannot function properly without oxygen.

The pigeon has to have sufficient red blood cells; these carry the oxygen to the muscles. Measurements on migratory birds have shown that proteins are also used during migration. Thus, the more difficult the flight, the more proteins are used. You can compare it to your car. If you go to the store to do some shopping, then you would not use your dipstick to see if the oil levels are down. If you hook up your trailer, loaded with all your belongings and drive over the mountains to Switzerland, then the first thing you should do at the end of the day is check the oil. The pigeon must eliminate these used proteins and new protein has to be supplied. We will discuss the sense and nonsense of proteins and legumes in another article.

Energy Use (part 2).

The first version of energy use was written several years ago. It was one of my first articles and it still is one of the main sources of information on flying racing pigeons. In this more scientific version I want to look at the subject much closer and here and there pose some questions. The average fancier will probably not find it too interesting. I'm writing this for those fanciers that want to progress in the sport. In order to advance some knowledge of the matter at hand will be necessary.

That's why I want to look at the supply of energy from a different angle than we have up to now. As a guide for this article I will use information from a well-know German veterinarian and scientist, Curt Vogel. He also began with information obtained from research done on this subject from around the world. His outlook and vision on the pigeon sport is respected by many. In his book (Tauben) many of the studies done by these scientists are brought to the forefront. I'm not declaring that everything written in his book is gospel, after all the book does date back to 1997.

Developments in the pigeon sport have not stood still. That's why there are parts of the book that I disregard and other parts that I want explore further. We have simply learned a lot more on certain subjects in the book since it was written.

This does not mean that I don't think it is an extraordinary book, from which you can learn a lot. I'd say it is base or a foundation on which you can build a house. That foundation is absolutely necessary in order to build a solid house that won't blow over when the storm winds blow. On this foundation we can build, rebuild, construct additions and change etc. etc.

One of the most noticeable differences when compared to other research is the energy supply. Curt Vogel also begins with the same sequence of energy use. First the glycogen and glucose stored in the (14% of the muscle mass) white muscle fibers, the liver and carried in the blood supply is used.

After that the fatty acids are burned. Vogel has a clear opinion and tells us exactly as he sees it. The amount of energy that can be stored in the body of the pigeon is limited according to the author of this book. Flying a total of 10 hours in one day is for a pigeon close to its maximum. For racing the pigeon has at its disposal the following fat reserves:

- Can directly use the fat metabolized from the last feeding before the race. That can amount to between 2.5 and 7.5 grams.
- Fatty acids stored in the red breast muscles (5.5 to 10.5 grams).
- Fat depots that are deposited under the skin, around the organs, intestinal tract, adipose tissue around the heart etc. in total 6.5 to 10.5 grams.

In total that adds up to 14.5 to 27.5 grams of fat stored in the body. With these amounts the limits on flying times were determined. Of course, there are pigeons that cannot fly longer than 6 hours on their glycogen and fat reserves. Other pigeons can fly a maximum to 10-11 hours without stopping and without having to switch over to burning proteins. The weight losses will lie at a maximum, between 30 and 40 grams (carbohydrates and fat).

The heart muscle delivers a constant performance and requires a lot of energy. Therefore there is a considerably more oxygen (O2) in the blood than in any other organ. We are talking about an average of 12%! At a state of rest there is 0.095 ml O2 or 5.7 ml O2 per hour used. Burning oxygen (O2) also leaves waste products (lactic acid) also “non carbohydrates” such as free fatty acids, amino acids and ketones (acidification of the blood).

Energy requirements increase as the speed of the race and the distance of the race increase. At a speed of 50km per hour the energy requirement increases 10 fold and at a speed of 70 km per hour it increases at a rate of 27 fold, when compared to the energy needs at a state of rest.

The amount of air used also increases substantially. When pigeons are flying at a speed of 70km per hour, they breathe in 14 litres of air, of which 5 to 7 litres is used for metabolism and 7 to 9 litres is used to dissipate body heat. When flying at 70km per hour, the rate of breathing increases by a factor of 70. The heat produced at the above mentioned speed increases by a factor of 20. All the above increases are compared to a state of rest. The amount of moisture lost per hour of flying averages 6.6 grams.

We could go on for quite a while giving you more information. I’ll spare you. That’s enough for now. Next time I will write on the scientific proof that protein metabolism during racing is undesirable. What I find fascinating in this account, are the possibilities of fatty acid storage and combustion.

If we carefully study the information that Curt Vogel gave us, than we see that we could possibly have 2.5 to 7.5 grams of fatty acid available from the last feeding and a maximum of 10.5 gram fatty acids stored in the red muscle fibers. The first one we can largely influence ourselves. The size and possible storage capacity of the breast muscles we do not have any control over. The pigeon will have “to show” us what its storage capacity is.

The storage of body fat is somewhere between 6.5 and 9.5 grams according to Vogel. Body fat is a hard fat; it is not fatty acids that are like drops between the muscle fibers. These liquid fatty acids are thus 7.5 grams +10.5 grams=18 grams. That is 2/3 of the total capacity. This is the 2/3 that we can influence. Which fatty acid combination (mix of grains, seeds and oil) gives the pigeon the most warmth and therefore the most energy? Again we have enough to think over.

Fielding

We are not too surprised, when breeding, our pigeons quietly and undisturbed go to the fields to search for what we can't give them. It is an animal's nature to provide as well as possible for their offspring. This is anchored in their genes. But when our widowers go to the fields we don't find this nearly as agreeable. In fact we think it is a real problem. It's probably not a bad idea to deal with this subject.

Too much of a good thing

Some fanciers had a peculiar problem. For several weeks (during their early exercise times) their pigeons flew straight to the fields, to search for and eat whatever they obviously lacked, the fanciers didn't know what. According to, one of these first class fanciers, it was impossible that the pigeons lacked for anything.

They fed a pellet that had vitamins, minerals and amino acids added. Sprouted seed was also provided several times a week. Several other natural products were also served regularly, such as seaweed and other protein products. Animal proteins were even thought of and different types of mineral product were available in the loft and added to the feed.

What in heaven's name did these birds lack? It was quite obvious to them they lacked something. From the loft they flew… directly to the fields. It was enough to drive them crazy!

My advice to them was to no longer add the pellets to their mixes or to stop adding all the other products. For a moment it was silent at the other end of the line. "I had thought of everything, but I had never thought of that", was the answer he finally gave. The pigeons can have too much of a good thing and then the balance is disturbed.

In order to restore this balance a more meagre diet is necessary. That was the reason the pigeons were eating dirt, small stones and other lower nutrient materials, they were trying to restore a balance. This week one of the fanciers called again. He stopped feeding the pellets and…the pigeons stopped fielding. Problem solved.

Deficiencies

The opposite can also occur. The pigeons search the fields for products that they can't find in the loft. Just exactly what they are looking often remains a mystery. There are fanciers who make the effort to find the exact area where the birds land and dig up some of the dirt to put in the loft, often with good results.

If the pigeons continue the ritual of fielding for a period of time then nothing seems to help, it has become a habit. Then all we can do is determine which of the birds are

bringing the others down. Sometimes it helps to remove these from the race team. A well-known flyer had this same problem once. He had tried everything but nothing seemed to help. One day he remembered that he still had some leftover fireworks stored away. At the exact moment the birds were getting ready to land at their familiar spot in the field a ”screaming kitchen maid” was lit at the predetermined spot. According to the fancier that was that, no more fielding. We’ll call this an “emergency measure”.

Animal protein

What are the searching for? What is it we don’t provide for them on our lofts? First comes to mind specific minerals. Many mineral mixes are very one-sided containing too much phosphorous. The phosphorous content of grain diets is much too high in relation to calcium. That is why mineral mixes should have a much higher calcium then phosphorous content. Otherwise the proportion of calcium to phosphorous in the diet will be way out of balance. The pigeons are forced to go the fields to look for more calcium.

Sometimes pigeons also have a need for proteins of animal origin. Usually we don’t give these to our birds. Living naturally they would perhaps pick up a worm or a snail. These types of animal proteins are highly useable by our pigeons. To compensate for this need we can feed our birds animal proteins. Some give cheese.

Cheese has high animal protein content but is also very high in fat. Our pigeons have a hard time processing these types of fats (animal) and it can cause them to lose form. Cheese cut into small pieces or rasped can’t hurt as long as we don’t overdo it. Prepare it in the morning and let it dry out all day. A better solution is fat free milk powder. It is lower in fat and quite high in animal protein. We can add milk powder to our feed with a sticking agent such as oil.

Universal

Another option is feeding egg food or better yet universal feed. There are some types on the market that contain small worms. These (dead) worms contain a large amount of protein. Universal food is mostly feed to finches and myna birds as a type of egg food. It is important to pay attention to the freshness of these products. The fats can quickly go rancid.

This universal food can be mixed with various products (grit, minerals, pick stone etc.) and put in a pot or nest bowl on the loft floor. Just watch them go after it. Usually it solves the fielding problem. Our pigeons are first of all, grain eaters. We shouldn’t overdo the animal proteins. Look at this information as a tip just in case fielding becomes a problem for you. Good luck in the upcoming racing season.

Developments in Feeding (Seminar in Putten/Holland) 1

More than 100 fanciers filled the pigeon union hall in Putten. They were all fanciers that had more than a normal interest in the pigeon sport. They were all fanciers that wanted to advance in the sport. They had come from far and wide to attend a seminar given by Bill Richardson from Tuscon, who gave an extremely interesting presentation.
As a curtain raiser for the event I was asked to do a short presentation on pigeon feeds and feeding. The theme I chose was “the future of racing feeds”. Can pigeon feeds still be improved in the future or do we already know all? I have attempted to find an answer to these questions. Read and tremble because in the future many changes will take place.

Current Developments in the Market
When we go on line or read the papers we are constantly bombarded with new developments in nutrition reported by scientists and universities. But, on the pigeon front new scientific knowledge on feeding is rare. When was the last time you read about research done for the pigeon sport?

When I look at what is going on around me, I only see movement in the direction of price. More and more manufacturers are only concerned with turnover and low prices. If we take a critical look at these mixes we realize that the main role they play is stomach stuffing.

The grains that are the cheapest at the time are the main ingredients in these feeds. I think this trend is a step backwards because it contributes nothing to the sound feeding practices required to allow the racing pigeon to perform at its maximum. We all know the pigeon sport market is a shrinking market.

Many older fanciers are giving up the sport are have passed on. Often it is the real hobbyist fanciers that give up the sport, because they cannot keep up with the specialists who practice the hobby as professionals. It is high time that we make the racing pigeon sport more attractive for the hobbyist.

Specialization within the pigeon sport has effects on feeding. The “remaining fanciers” are constantly searching for more information on feeding and want to remain informed on any new developments. Money for research is scarce. Therefore we will have to use information on developments from around the world. We will have to watch developments in human nutrition as well as developments in nutrition as it applies to commercial livestock; there is money available for research in these areas. From these sources we can extract information and do some research and testing with our pigeons.

At the moment many researches are directing their research in the fastest growing areas of disease, the heart and vascular diseases. The relationship between these diseases and nutrition are being fully studied. Naturally scientific opinions in these areas are divided. We can also use the information that developments in the area of human sport nutrition give us. All this information cannot be applied directly to the racing pigeon sport. Therefore it will be necessary to do a lot of specific research with our racing pigeons.

It is too bad that this type of research is very seldom done. The feed industry should more often direct itself to improvements in animal nutrition, so that our animals could perform better and live healthier. In my view today's remaining fanciers are in search of improvements in all areas of the sport. This is the group that I want to address. We have done various tests that could be termed as pioneering and that will soon turn the racing pigeon feed industry on its ear. What is to be thought of the following?

The influence of marketing

Today we also see other developments popping up from time to time. Especially the Germans seem to lead in some of them. They could be seen in every hall at the Exposition in Kassel. Luxurious, fancy packaging is steadily playing a greater role and different products are presented in such a way that we as good fanciers find difficult to ignore. Certain grains, dipped in certain liquids that will do wonders for our pigeons. Extruded pellets, vegetable and herb pellets, vitamin pearls attached to the feeds, all of which have fantastic properties credited to them.

That doesn't mean that there aren't good extruded pellets on the market, but the promises keep getting bigger. It is cleverly suggested that you have to participate; otherwise your pigeons will not be able to keep up with the best anymore. In short: marketing is becoming an influence.

Bordeaux corn (wine red colour) can be found in the various mixes of certain manufacturers. They state that this corn contains a fat percentage of 9%. When questioning one of the two largest exporters in the world we were told that all varieties of corn contained 4 to 5 % raw fat. They have fields where they cultivate corn all over the world and could not deliver to us a corn variety with fat contents this high. This certainly makes a nice marketing story?

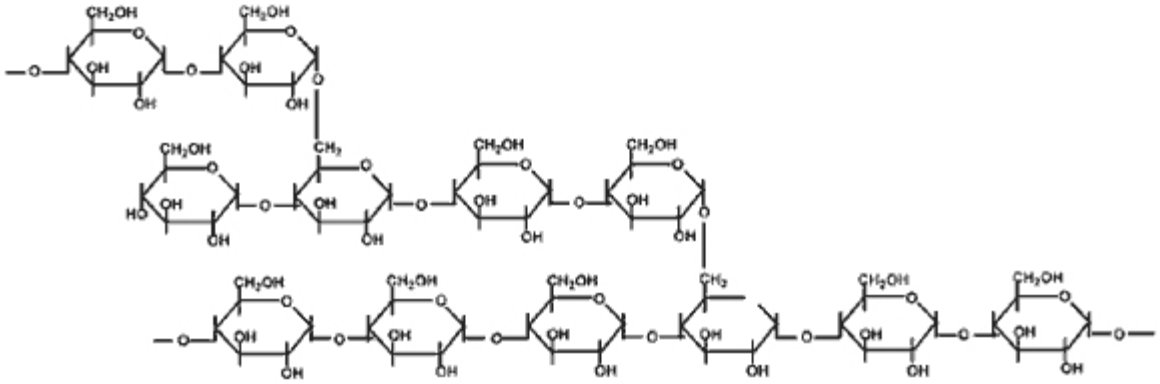
A new variety of corn with red little lines on it gets a spot under "new developments and new products" in the largest pigeon publication in Germany "die Brieftaube". I can only see it as an attractive variety amongst all the other corn varieties. It is nice to look at but has no added qualities for us in the pigeon sport. There are also different colours of safflower offered (dyed). How long will it be before this starts to make inroads in the pigeon market? What values will be given to similar products? Yes, marketing will have an influence in the pigeon sport, even in the Netherlands.

What you get out depends on what you put in
Marketing in most cases is “creating a need where one didn’t exist”. Sometimes good research is done and products are developed that are really helpful. But, usually they help only the manufacturer. So be careful, beware! The question can be asked: do we know all there is to know on performance pigeon grain mixtures? Can we still make improvements and modernize ordinary grain mixtures?

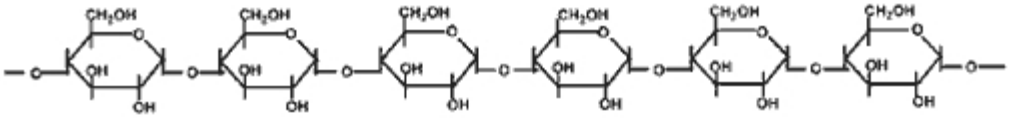
Are all the manufactures finished mixing? I’ll try to make some sense out of all the different studies that we have done. My first statement is: What you get out depends on what you put in. You have to invest in the future, nature will reward you. Just as good quality corn seed will reward us if we plant it in good rich soil. You have to depend on Mother Nature for the rest. It makes no sense not to trust nature. We don’t have to dig up our seed grain every day to see how its’ doing, that just isn’t sensible. We have to leave it to nature. It will do the rest. One day a fine-looking plant will come out of the ground.

Carbohydrates
When we look at racing mixes then we see that most mixes contain between 55% and 65% carbohydrates (carbon-hydrogen and oxygen atoms). These are starches. There are different kinds of carbohydrates such as: monosaccharide (grape sugar / fruit sugars), disaccharide (cane sugar / beet sugar / maltose), tri and polysaccharide (starch for building reserves). Besides these we also have cellulose (plant fiber).

Amylopectin
When choosing pigeon feeds in particular racing mixes it is important to choose those that contain as large a proportion of their carbohydrates (glucose) that is taken up and used as gradually as possible. Why? Because pigeon racing is not a sport that requires a short explosive effort but a longer sustained effort, it is an endurance sport. Grains contain mainly polysaccharides (starch). The chemical structure of starch in grains is: amylose and amylopectin.



amylopectine



amylose

Source: (Wikipedia)

As you can see in the diagram amylopectin has a branched tree like structure. It is the largest natural molecule and has more than 10,000 units of glucose. The structures are bound together by Alph-1, 4 and Alpha 1, 6 connections. The a-1, 4 bindings are what we call the fast sugars.
These provide the body with direct energy and cause an abundance of insulin to be present in the blood stream in order to achieve an explosion of energy.

The a-1, 6 bindings occur in about 25 units and give the molecule its tree like structure. They take longer to assimilate and are released gradually for combustion. During flight when attacked by a raptor the a-1, 6 bound glucoses are used. They are also called on when the pigeon has used up all its fat reserves on the journey home.

Amylose
Amylose is an unbranched molecule with only a- 1, 4 bindings. They are therefore the fast carbohydrates. Most grains have a starch content that is made up of amylose / amylopectin in a proportion of 1 part amylose: 3 parts amylopectin. There are two exceptions. These two exceptions contain only amylopectin. This glucose as we have shown is better taken up in the body and is better utilized in combustion for energy by the body. These two exceptional grains are: *corn and rice*. Earlier tests that we have done have already shown that pigeons fed with 80% corn and 20% regular mix after one hour of exercise flew higher and exercised the best.

The pigeons that were fed 80% oat groats (peeled oats) and peeled barley with 20% pigeon mix flew best and highest above the loft at the beginning of the exercise period. But after an hour of exercising they had to move over for the “corn pigeons”. The pigeons fed a regular breeding mix made a few circles above the nearby roofs and had to acknowledge the superiority of the other two groups.

Which carbohydrates are present in pigeon feeds?
Another look at the carbohydrate grains shows us that most contain phytinic acid. Phytinic acid interferes with the absorption of iron and other minerals. Iron is necessary for the production of red blood corpuscles that in turn utilize oxygen.

Oxygen and fuel = power and that is a very necessary process for pigeons taking part in athletic events. The grain that contains the most phytinic acid is wheat. Therefore it is sensible to keep the percentage of wheat low in racing mixes. Even if wheat is one of the cheapest grains it should not be one of the main ingredients in a racing mix.

The most suitable carbohydrate rich grains
The grains that contain much lower amounts of phytinic acid are: corn and rice (There they are again!), white dari, milo (red dari) and millet. These are the grains we should use in larger amounts in racing mixes.

(Translators note: The milo and dari mentioned in the original, to the best of my knowledge are varieties of sorghum)

The less suitable carbohydrate rich grains
Carbohydrate less suited because their structure or the amount of phytinic acid they contain are: oat groats (peeled oats), pearled barley (peeled barley), buckwheat and legumes.

In part 2 we will look at the composition of the fats and proteins. Here we will also find some very interesting thoughts on the composition of the pigeon mixes of the future, that will open some eyes. I will then make up a suggested mix for Sprint / Middle Distance racing and one for Middle Distance / Long Distance racing.

Developments in Feeding (Part 2)

Now that we have discussed the carbohydrate content of our racing mixes, we know it is important to select the correct grains. With the newly acquired knowledge we now have the composition of our racing mixes will change considerably. In particular the Sprint racers will have followed the new developments with great interest, but also the rest of us have carbohydrate content in our mixes of 50% to 60%.

Amino Acids
Now we will look at the amino acids (protein). Legumes in particular contain a lot of protein. In order to perform well while racing we require power for the muscles, the energy is provided by glycogen and fatty acids and the fuel to burn them is oxygen. The disadvantage of legumes is that the high percentages that usually are given at the end of the week will almost certainly ensure that the bird has a less than ideal supply of oxygen.

The pigeons digest barely 25% to 30% of the proteins from legumes, which means that 75% of the protein they contain will have a detrimental effect on the birds system because the by-products produced during digestion of these proteins will have to be eliminated**.** The conversion of proteins from legumes into bodily proteins takes from 48 to 72 hours. This process therefore has a detrimental effect on the birds while racing.

Gradually the oxygen supply will diminish and after flying for 4 to 6 hours good athletic effort by the bird becomes difficult. The colour of the breast muscles will become blue, which indicates a lack of oxygen. Building and repairing muscles requires protein (the first part of the week) and is not required as fuel for flying.

That is why it doesn't make sense to feed to many peas and beans to the pigeons during the last days before basketing them for a race. Not feeding any protein is impossible because all grains and seeds contain protein.

It becomes a question of feeding the grains and seeds that will do the least damage. It would be more sensible to choose for less protein and protein that is more easily digested at the end of the week.

If the fat requirements have been met earlier in the week than you can use good carbohydrate grains (such as corn) for the last two meals in an energy rich mix (middle distance / long distance) thus lowering the protein content. This leads us to use of the following grains and seeds:
Toasted soybeans, safflower, sunflower seeds, peeled sunflower, hemp, cabbage seed, rapeseed, flax seed and peanuts.

Fatty Acids

The most important source of energy for pigeons are the fatty acids. They are stored in the red muscle fibers and provide energy for the flight home. It is the most important fuel for most of the flight further than 300 kilometres. In the past we have spent a lot of time discussing how much fat we should send along with our pigeons to the race point. Recently more time and attention has been paid to the makeup of these fatty acids.

You are probably familiar with the articles on the proper use of the fatty acids. Now researchers are looking more closely at the importance of the composition and the structure of the fatty acids. Oils are made up of linoleic acids and linolenic acids. Linoleic acids are the omega 6's and linolenic acids are the omega 3's.

According to some researchers there is an ideal proportion between the two types of fatty acids. This proportion is important especially for the immune system. An incorrect proportion will result in illnesses and inflammation according to these researchers. Presently scientist are recommending as an ideal proportion for people as being 4:1. That is for every 4 parts of Omega 6 there should be 1 part of Omega 3 fatty acids.

This proportion is also important for our racing pigeons. According to some researchers a proportion of 2:1 is required for ideal results. Therefore oils have been developed for the consumer markets that have a better proportion of these fatty acids. That's good, very good in my opinion and I am a fan of these oils. Still I am very apprehensive about their use.

Why? We can coat my feed with oils such as these. Most pigeon mixes have a fatty acid proportion of 50:1 to 30:1. I add one of these oils and Bingo! Well not really! Try adding 200 cc of one of these oils to 1 kg of grain. It will look like grain floating in a swimming pool! We can add maximum one tablespoon of oil to a kg of mix. One tablespoon on 1 kg of feed only makes a difference of 1%.

That one percent is definitely a step in the right direction but it really is only a drop in the ocean. It's like being on a pub crawl and your buddy after drinking twenty beers decides to order a glass of mineral water and declares "look guys I've stopped drinking, I'll drive home".

That really doesn't sound like such a good idea. Let's get back to our racing mixes. It would seem that one percent change in the oil composition would have very little influence on the immune system. We will have to take a closer look at the mixes to see if we can improve them.

Presently our race mixes often contain a lot of safflower and sunflower. We sometimes feed peeled sunflower seeds before a long or tough race. I have often

advised doing so. But in the past I did not pay as much attention to the proportions of the omega fatty acids. Making sure that they had sufficient energy stores was always and will remain the number one concern. The following table will give a synopsis of some of the oil seeds.

	Amount of n-6 fatty acids in grams per 100 gram			Amount of n-3 fatty acids in grams per 100 gram		
	Linoleic acid			a–linolenic acid	EPA	DHA
Sunflower Oil	630		(630:1)	1	0	0
Corn Oil	50		(5:1)	0,9	0	0
Soy Oil	52		(7:1)	7,3	0	0
Rape Seed Oil	20		(2:1)	9,6	0	0
Flax Seed Oil	20		(2:5)	50	0	0
Peanut Oil	13		(32:1)	0,4	0	0
Hemp Seed Oil	60		(3:1)	20	0	0

We see a lot of safflower and sunflower seeds in many mixes; this as we can now see gives a completely incorrect proportion of the omega 6: omega 3 fatty acids in the oil content of these mixes.

This is not good news for an efficient well functioning immune system and the pigeons will more easily fall prey to the various diseases and infections. It is also true that many fanciers simply feed to little fat, which keeps their pigeons from performing at their peak. I do not want to discourage anyone from feeding fats to their pigeons. Providing sufficient energy is essential. But I think we have to do a better job.

Searching for a balance

Often we have to find compromises when we put together a mix. Cabbage seed, rape seed and flax seed have better values in the proportions of the omega fatty acids, but also contain a lot of prussic acid. Adding high percentages of these seeds to the mix would be irresponsible.

Flax seed also increases phlegm and is better limited to being used at the beginning of the week. There is also the fact that these seeds are low in fiber, which is required for a well functioning intestinal tract. Too much cabbage seed, rapeseed and flaxseed create a mix that doesn’t provide enough bulk for the intestinal tract.

This could easily lead to watery droppings and that is also an important consideration. It is not easy to make the right choices, but clearly we can do better. A mix made up of ordinary grains and seeds, certainly has a future. These are not readily available on the market but there are some things that the fancier can do for himself. As promised in Putten I will provide two mixes in this article. The first one is appropriate for Sprint/Middle Distance races and the second is meant for Middle Distance/Long Distance races. If you have a source of single seeds and grains you can mix these yourself, they are not available as mixes anywhere that I know of.

Sprint/Middle Distance			**Middle/Long Distance**	
Grain:	Percentage		Grain:	Percentage
Corn (all types)	32.5 %		Corn (all types)	30 %
Barley	5,0 %		Barley	5,0 %
Milo (red dari)	15 %		Milo	10 %
White Dari (Milo)	10 %		White Dari (Milo)	7,5 %
Paddy rice	10 %		Paddy rice	7,5 %
Millet	5,0 %		Short grain Rice	2,5 %
Toasted Soy Beans	5.0 %		Millet	2,5 %
Dun peas	7,5 %		Hemp	5,0 %
Green Peas	5.0 %		Rape Seed	2,5 %
Mung Beans	2,5 %		Flax	2,5 %
Flax	2.5%		Safflower	2,5 %
			Green Peas	7,5 %
Omega Ratio: 5:1			Toasted Soybeans	5,0 %
			Dun Peas	7,5 %
			Mung Beans	2,5 %
			Omega Ratio: 4:1	

The first mix is a base mix for the Sprint and Middle Distance races and does not meet the needs for all situations. The fancier will have to adjust it with for example a Cleansing Mix at the first of the week and add some corn and small seeds during the second half of the week.

Values for Sprint /Middle Distance Mix				
Fat	Protein	Carbohydrates	O.E.k.Cal	Fiber
4.3	12.1	64.0	3211	4.3

Values for Middle Distance /Long Distance Mix				
Fat	Protein	Carbohydrates	O.E.k.Cal	Fiber
7.8	14.3	57.4	3333	5.6

The second mix is also a base mix and the fancier will have to add or switch over to a well-balanced energy mix at the end of the week. This mix by itself is a high-energy base mix containing mainly good fatty acids, not to many detrimental proteins and good carbohydrates. I know that I have not addressed all the different circumstances that may arise. But, I have endeveared to lay a foundation for a new vision on the composition of the racing pigeon mixes of the future.