

## The Water Cycle

*During its cycle, water goes through different reservoirs.  
The sun's heat causes evaporation on the surface of the oceans.  
This water vapour (1st reservoir = 0.001% of all the water on Earth)  
forms clouds which are blown along by the wind.  
At altitude, under the effect of the cold, they are transformed into snow, hail or water  
(2nd reservoir = ice = 2% of all the water on Earth).  
The water then soaks into the ground (3rd reservoir = underground waters = 1% of all the water on Earth).  
The water reappears in the form of springs, waterfalls, which are rapid waters.  
The torrents form rivers and streams, which are the calm waters.  
The ponds and lakes form the stagnant waters (4th reservoir = 0.01% of all the water on Earth).  
Brackish water (at once fresh and salty) and the salt water of the seas and oceans form the last reservoir  
(approximately 97% of all the water on Earth).*

### **The visit of the Aquarium follows the water cycle**

#### **Underground waters:**

*Tank no. 1*

#### **The rapid waters of the torrents:**

*Tank nos. 2/3/4/6*

#### **The calm waters of the rivers and streams:**

*Tank nos. 7 to 14*

#### **The so-called stagnant waters of the lakes:**

*Tank nos. 15 to 18*

#### **The brackish waters:**

*Tank nos. 19 to 21*

#### **The waters of the seas and oceans:**

*Tank nos. 35 to 40*

### **TANK N° 1 / UNDERGROUND WATERS / The Cave**

A few thousand years ago, some important upheavals occurred on the surface of our planet. Among these upheavals, some major earthquakes meant that a certain number of these fish were trapped under the earth, in layers of water. These fish had to adapt to a new environment, the dark. The total absence of the sun's rays has made these fish, the Charcains, today into cavernicolous fish that are blind and depigmented (have no colour). Charcains are all born with sight, but a few weeks after their birth, a greasy skin grows and makes them blind. In the total darkness their eyes are useless. On the other hand, a highly developed lateral line (compared to other fish), serves as their radar. Their excellent sense of smell allows them to find their prey.

### **TANK N° 2/3/4 / RAPID WATERS / America - Asia - Africa**

Fish that live in rapid waters need to resist the current whilst trying to make the minimum of effort. They therefore need at least a hydrodynamic profile, smooth skin and a powerful ability to swim. In our regions, this is case of trout for example. They are said to be rheophilic (they resist the current). The animals present in these three tanks swim only rarely. As soon they stop moving, they fall to the bottom of the river. In fact, they have an atrophied swim bladder (a pocket of gas situated in the abdomen). It is this bladder that generally enables fish to hold up in the water.

### **TANK N° 5 / THE NURSERY**

These baby crocodiles were born in Pierrelatte in July 2006. They are young Nile crocodiles.

### **TANK N° 6 / THE CREEK**

We are in the lower part of the torrent. The water is not very deep and the river bed is rich in alluvium. Guppies, platys, sword-tails... have a particular feature, they are ovoviviparous. Unlike other species of fish, which lay eggs directly in the water which then become small fry, the females keep the eggs inside their bodies. The eggs hatch inside the body of the females then the little ones are born. When the female gives birth, the young fish are immediately able to swim and feed.

### **TANK N° 7 / CALM WATERS / The Amazon Basin**

In this tank, we can see a shoal of piranhas. There are about thirty species of piranhas and most of them are omnivorous. Only one species out of the thirty is carnivorous, which is the red-bellied piranha. The largest piranhas are called PACU. They are fed with white meat, fish, mussels...In the wild red-bellied piranhas move about in shoals of 1000 to 2000 individuals. Necessarily when they feed, they can eat a great deal and in very little time.

### **TANK N° 8 / CALM WATERS / South-east Asia**

These fish are freshwater shark. They do have the shape of a shark, but they are unconnected to the family of sea sharks that you will see at the end of the visit. They eat everything, but the juveniles feed mainly on live food. Older individuals lose their teeth and move on to plants as a source of food.

The black fish with the red tail is called *Labeo bicolor*. When its colours are bright, it means the water is of excellent quality, if not the *Labeo* becomes dull.

Silver sharks move around in shoals, and they are capable of leaping high out of the water.

The clown loach come out especially at night. They are capable of emitting a clicking sound (broken glass). They are able to do this thanks to two small spines they have at the edge of their mouths. These spines are used mainly to break the shells of the freshwater snails that they feed on.

### **TANK N° 9 / CALM WATERS / Australia / New Guinea**

Australia is a country/continent that was isolated from the rest of the world in a short space of time(continental drift). This led to the appearance of some very particular species of animals (kangaroo, koala bear...). This is also true for fish, since these species can only be found there, and nowhere else. They are said to be endemic.

These fabulous fish are called Rainbow fish, and indeed, depending on how the sun falls on their scales, we can see blue, green, yellow, red reflections... Their particularity lies in their eggs. These have two short, sticky filaments enabling them to fix onto plants. This is to avoid the eggs falling onto the ground and being eaten up.

### **TANK N° 10 / CALM WATERS / Equatorial Africa**

The African rivers carry along a lot of alluvium and mud. The waters are thick and rather brownish or yellowish. Fish have trouble recognising each other in such waters. But nature has been clever. The shoal of fish towards the middle of the tank is called head-and-tail-light fish, because of the light that appears in their eyes. Obviously they do not produce light, it is the top of their eyes that is like a coloured mirror and which reflects external light. Also, note the fish with the red body covered with luminous blue scales, which we call the Lifalili. This tank also contains knifefish, which have a long anal fin which sways when they move. It is one of the rare fish capable of moving backwards. The butterfly fish or pantodon have the particularity of being able to fly on the surface of the water to catch their food (flies for example). They are difficult to see because they only swim at the surface of the water. The funny fish with long moustaches are members of the catfish family, called lizard fish. These are essentially nocturnal fish and it is thanks to their moustache that they can find their food in the sand.

### **TANK N° 11 / CALM WATERS / The South American Selva**

These enormous copper-coloured fish are called Oscars. They have one special feature, which is the presence of an ocellus on their tail (black spot). This ocellus serves two purposes:

Each fish has a different shape mark (like an identity card), which allows them to recognise each other.

The ocellus serves as a trompe l'œil. When a predator approaches, it cannot tell which is the front and the back of the fish.

### **TANK N° 12 / CALM WATERS / Central America**

In Central America there are no or few plants in the bottom of the rivers. The oxygen is partly provided by plants on the surface. These fish are part of a large family of fish that we find everywhere in the world. It is the Cichlidae family whose particularity is to protect their eggs and their young.

These fish are known as bulldozers. In fact, just like a bulldozer they dig holes in the stones. Why do they do that? To build their nest. A nest for each couple. They take the pebbles with their mouths and build walls. Once the eggs have been laid on a smooth surface by the female, with the help of the male she ventilates them by hovering above them and beating her fins vigorously. The couple then ferociously protect their young against anything that approaches, even animals much bigger than themselves.

### **TANK N° 14 / CALM WATERS / The Discus**

This tank is a veritable tableau vivant. The magnificent round, flat fish are Discus fish. They have deep colours. Discus fish are cichlids and they protect their young. The male and the female "breastfeed". This is a rare feature in fish. They do not have teats but glands situated underneath their scales that produce something like a thick, transparent milk which is called mucus. It is on this mucus that the young fish feed until they are able to eat on their own.

### **TANK N° 15 / SO-CALLED STAGNANT WATERS Lake Tanganyika**

In Africa the three great lakes are veritable ecosystems: Lake Victoria, Lake Tanganyika and Lake Malawi. These fish are cichlids. They live in a rocky environment where they like to hide. They are relatively territorial fish which defend their territory ardently. They are mostly specialists of cool cavities, underneath the rocks. Incubation lasts about a week. The different species: - the "black molly" cichlids with their magnificent tail - the "lemon" cichlids which are bright yellow - the "julido" cichlids with their horizontal stripes - the "Frontosa" which, when fully grown, have a large bump on their foreheads.

### **TANK N° 16 / 17 / SO-CALLED STAGNANT WATERS The Tactile Tanks**

Anglers will recognise some of these fish – we can see carp, roach, tench. The coloured carp that we call Koï carp come from Japan and China, where they are seen almost as divinities. They can become exorbitantly expensive depending on size and the motif on their scales. Sturgeon, fish with an archaic form, lay eggs that are much sought after known as caviar.

### **TANK N° 18 / The Starfish**

A curiosity: the starfish. The starfish is an echinodermata, which usually has five arms radiating from a centre and which can reach widths of 45 cm. There are at least 1 600 species divided into over 30 families in all the oceans.

It does not have a moveable skeleton but pseudopods, small tubes also present in sea urchins, which can project water from the ventral side and which are used for locomotion and feeding.

The starfish is a predator. It feeds through its buccal orifice situated on its ventral side.

### **TANK N° 19 / MUDSKIPPERS**

These are "walking" fish. They live in the brackish waters in the mangroves. They are amphibian fish, that is to say they are capable of living in water but also out of the water. Two of their (pectoral) fins are transformed into feet and allow them to climb out of the water. They continue to breathe with their gills when they are out of the water, but to do so they store water in a pocket near to the gills.

### **TANK N° 20 / ROYAL PYTHONS**

This is an animal that has always fascinated. Legend tells, moreover, that when it dies, the python leaves behind it a giant diamond. These two pythons are royal pythons originating from tropical Africa, where they often live in termite mounds. When fully grown, they can reach a length of 1 m to 1.50 m.

### **TANK N° 21 / SO-CALLED STAGNANT WATERS - LAKE MALAWI**

The African lakes are veritable ecosystems: they are often compared to the sea. They have tides, strong currents and surface winds. The fish that live in them have a great variety of colours and are also very aggressive. They are all cichlids. These fish are constantly fighting to defend their territory, or for the females, to defend their young... A particular feature in the females is that they practise what is known as mouth brooding. When they lay their eggs and they have been fertilised, they take them in their mouth. They incubate the eggs in this way and protect their young until they can get by on their own. This can take 2 to 3 weeks.

### **TANK N° 22 / CROCODILES**

These are two superb Nile crocodiles. These animals are now protected by the Washington Convention.

Crocodiles have the particularity of growing throughout their lives. So we find specimens in the wild that are over 5 metres long and which can weigh more than a tonne. This species occupies almost the whole of Africa, except the Sahara and Madagascar. The crocodile, like all reptiles, is not warm-blooded, so it is obliged to warm it in another way by lying in the sun for hours and hours without moving in order to digest its food better. They are covered in scales which do not overlap and which are called scutes. The scales are very well irrigated to facilitate heat exchange. The carapace of the crocodile consists of bony plates known as osteoderms making up the dorsal shield. There are virtually no osteoderms on the crocodile's belly and this is why only this part is used as leather.

The crocodile has been a fearsome aquatic hunter since the dawn of time as they have existed on earth for 200 million years, which means they knew the dinosaurs. This animal is designed for the aquatic environment: the shape of its body, the short legs, a powerful tail, the sensory organs situated at the top of the head make it a hunter that is very adept at lying in wait. The crocodile jumps out of the water to seize its prey and will not let it go until it drowns. The crocodile's jaw has one defect, which is that it is heavy and only has two muscles to open it, which is why a simple strip of rubber is enough to immobilise its jaws. However, as far as closing them is concerned, several very powerful muscles come into action and exert 1.3 tonne of pressure per cm<sup>2</sup>. They can crush absolutely anything. Another advantage is that the crocodile has no need for a dentist, because when

it loses a tooth or one breaks, another one grows immediately in its place. The crocodile swallows large pieces of meat without chewing and takes a long time to digest them. A large crocodile can eat a zebra, and then eat nothing else for months, or even a year. Another particularity of the crocodile is that it eats pebbles. Indeed, as crocodiles do not chew their prey, they often swallow pebbles to facilitate their digestion and to crush the bones in their stomach. These pebbles are also used, we suppose, as ballast when the crocodile moves under the water. On the ground, it is quite clumsy, even if it is capable of moving at more than 10 km/h, which it often does when throwing itself in the water when other individuals approach.

*How to tell a crocodile from an alligator?* The crocodile has on its lower jaw a large tooth, the fourth from the front. This tooth lodges in a slot in the upper jaw, but remains visible when the jaws are closed. In the alligator or the caiman, this fourth tooth lodges in a cavity in the upper jaw and is therefore no longer visible when the jaws are closed.

### **TANK N° 23 / THE SEBA PYTHON**

The Seba python comes from the desert zones of Africa. This snake can reach lengths of 5 to 6 metres when fully grown. It suffocates its prey before swallowing it.

### **TANK N° 24 / DESERT TORTOISES**

The land tortoise otherwise known as the "garden tortoise". The tortoise belongs to the class of reptiles.

The Chelonia order includes 13 families of sea turtles, freshwater terrapins and land tortoises and approximately 300 species. All the land tortoises belong to the suborder of cryptodires, that is to say tortoises that retract their neck into their shell curving it into a S-shape. Land tortoises live on all the continents. They can live in tropical environments, in arid zones and even in the desert (such as these ones). Land tortoises all have in common a virtually vegetarian diet (plant feeders).

In the wild they are herbivorous, frugivorous and folivorous. They therefore have a varied diet as they eat not only leaves, but grass, flowers, fruit or roots.

### **TANK N° 25 to 34 A SHORT WALK**

Short, relaxing corridor before returning to the sea water and the discovery of the Coral Reef.

### **TANK N° 35 / SEA WATER AND THE OCEANS - THE CORAL REEF**

In Alsace we have no sea water, so we produce it here ourselves with special salts. This first tank represents the coral reefs. The "flowers" or "mushrooms" that you can see all over the tank are coral. Corals are animals that live in colonies. Some of them are soft and others are said to be hard, which means that they construct a calcium carbonate skeleton. It is this skeleton that will be used by the corals to build the famous coral barriers. Coral reefs are very important for the oceans as they serve to filter enormous quantities of water. They are also important for us, because contrary to popular belief, it is the coral reefs that provide the most oxygen on earth and not the great tropical forests. The other invertebrates, such as sea urchins, or the hermit crab are crustaceans with soft shells and which live inside empty snail shells. Algae-eating gobies and sleeping gobies constantly dig and filter the sand to feed on the animals that live in it. The cleaner wrasse cleans and removes the parasites from other fish. This particularity is an advantage for the wrasse as it provides it with its food and it is also an advantage for the other fish, which are able to get rid of their parasites.

### **TANK N° 36 / SEA WATER AND THE OCEANS - THE FISH OF THE REEF**

The different families of fish: the damselfish, with the zebra damselfish, the lemon damselfish, the chocolate damselfish. The butterfly fish with their long beaks that enable them to feed between the coral branches. The blue surgeon fish, so-called because at the base of their tail, they have two very sharp spines known as scalpels which they use to defend themselves. The vanilla/strawberry fish is yellow with a pink stripe on its back.

### **TANK N° 37 / SEA WATER AND THE OCEANS - THE SHARK TANK**

This final aquarium in the visit contains almost 100 000 litres of reconstituted sea water. The very thick glass (4cm) panels weigh almost ½ tonne each.

2 species of shark are featured in this tank:

The large sand shark, bullhead shark or nurse shark which often hides in the rocks to sleep. It mainly comes out to feed.

The black-tipped sharks, a male and a female (the larger one). Fully grown, they can reach 2 metres in length. The particularity of this species and of many others, is that they are obliged to swim all the time even when they are eating or sleeping. If they do not, they do not get any oxygen in their gills and risk dying of asphyxia.

Sharks can see relatively well, but they also have an overdeveloped sense of smell. They can smell the minutest dilutions of blood or fish flesh... This is why we see them circling round their prey – in fact they are getting closer and closer to the source of the smell. Once the prey has been caught, several rows of teeth take charge of cutting up pieces of flesh that they will swallow whole without chewing.

Swimming with the sharks are also remora or suckerfish. The sucker they have on their head is in fact a former fin that allows them to attach to the underbelly of the sharks. They rid the shark of its parasites and in exchange, the shark provides them with transport, protection and food.

Puffers are capable of puffing themselves up with water or air and can reach 2 or 3 times their normal volume to impress a potential attacker. Some of them have spines on their body that stand up when they puff themselves up making them look like hedgehogs.

The flying lionfish, also known as the scorpion fish, is magnificent, but also very dangerous for in each of its dorsal spines there is a lethal poison, lethal even for man.

The moray (2 leopards and one green). Their lifestyle is essentially nocturnal and they are very territorial. They live in holes inside the rocks and can inflict serious injuries thanks to their fearsome razor-sharp teeth.

The batfish, or platax, live in ports where they feed on waste from the boats.

Different species of groupers: the red grouper, the green grouper. Groupers are able to swallow prey almost as large as themselves.

# VISIT OF THE FARM

## 1. WHAT IS A FARM?

It is a place which includes land that is cultivated and buildings to house the animals (such as sheep-pens, stables, the farmyard....) There is also the farmhouse and a shed for the machinery used on the farm.

This living place is not the same all year round.

**In autumn:** The animals' hair collects in packets – this is the phenomenon of moulting. The pigs break the acorns that fall from the trees... The mammals form a thicker coat in preparation for the winter. The birds also change their feathers and the old ones lay strewn on the ground. The billy-goat smells stronger than usual, it is the mating season....

**In winter:** The farmer has to check that the water does not freeze over and that the animals are drinking normally. He adds straw to the pens, where the animals are sheltering from the cold. The hens lay fewer eggs. Grains are put out for the birds and other birds steal in from the city to find food. The mammals have more hair, and they are given more hay. At the end of the winter the lambs start to be born.

**In spring:** The farm finds itself in a green setting once again. The fruit trees are covered in blossom, the petals will soon cover the ground. The birds: the males clash and surround the females ready to mate. The females prepare the nests for the eggs before sitting. We are in the moulting period and feathers are used to finish off the construction.

The mammals: The goats give birth to kids. The ewes give birth to the first lambs of the season. During the warmest days the Equidae are hosed down, the old hair falls off and the new hair takes its place. The pigs are bothered by the sun and roll about in the mud.

**In summer:** The peacock loses its fine feathers.

## THE FARMER

*The person in charge of the farm is called the farmer. He looks after the animals but also the crops.  
At the Naïades it is the animal keeper who looks after the animals.*

## WHAT IS A FARM FOR?

In the past:

The first men lived from hunting and fishing. They then began to farm crops and livestock and they settled on farms of different types according to the climate and the animals in each region.

As farms were largely self-sufficient, they included everything it was possible to keep and grow.

Today:

Farms are specialised. There are "nursery" farms, livestock farms specialising in certain animals.

The animals are no longer always fed with the farm's own produce (some livestock farmers were not even aware that the way they were feeding their animals was not healthy (mad cow disease)).

Today, there are the farms that respect the environment, those that emphasise good local produce, and a return to tradition, those that are obliged to concern themselves mainly with yields.

Tomorrow:

Agriculture will have to find a new balance and take into account worldwide parameters.

## THE ANIMALS ON THE FARM

### The birds

They are present in the farmyard. The different birds have different calls.

The cock crows, The hen clucks.

The goose cackles, The duck quacks.

- The wing is a sort of leg that has been transformed for flight.

- The covert feathers are soft and colourful

- The flight feathers: the feathers on the wings are rigid and solid. They press on the air to carry the flying bird.

- The down is the feathers near the skin. It is soft and keeps the bird warm.

Birds' beaks are adapted to the way they feed.

It should be noted that birds do not have teeth. They ingest their food whole.

For the older ones:

There is no pre-digestion inside the beak (no saliva glands). The food crushed in the gizzard is attacked by acid in the gastric juices.

### The geese

The goose is bred for its meat and especially for its liver (the geese are force fed to obtain the foie gras or fattened liver).

Geese lay fewer eggs than ducks, but both parents protect the nest and the young. The male goose is called a gander.

The goose starts to lay at between 280 and 320 days and lays an average of 50 eggs per year. Incubation lasts 28 to 30 days.

There are two groups of breeds:

White geese, the female weighing 5 to 7 kg, the male 6 to 8 kg (Bourbonnais goose, Poitou goose).

Grey geese, which are heavier, weighing 8 to 9 kg and 12 kg respectively (Toulouse goose, Landes goose).

## 2. The horse family

The horse family (Equidae) are the mammals that belong to the same family as the horse, such as donkeys and zebras.

They are perissodactyls, which means they have an odd number of toes, in this case one.

### The Shetland Pony

This pony originally comes from the Shetland Islands situated to the North of Scotland. The first traces of the Shetland pony go back to the Ice Age.

Food: Generally speaking, grazing is enough for a Shetland pony who does not get too much exercise. He needs a mineral salt lick stone and clean water.

We give the ponies hay and good quality straw and a small quantity of granules for horses.

Reproduction: The female can have up to 20 foals during her life. The pony is adult at the age of 4 years: by then it has reached its full size of between 90 cm and 105 cm.

When winter comes, it is covered by a coat of tight, dense hair, a naturally rainproof coat that will allow it to cope with the harshest cold without any trouble.

Further on, we meet: a pony, a mule and the donkeys.

## THE OVINES

### The sheep

For the older ones:

These are domestic herbivorous mammals who are members of the Caprinae subfamily in the Bovidae family. Man keeps sheep in particular for their meat, their milk, their wool and their skins, with a type of leather called "basil" is made.

The young of the sheep is the lamb, the female the ewe and the male the ram. The sheep is a timorous animal, which likes to live in a flock. Ewe's milk is used to make different cheeses.

The sheep bleats.

The sheep are shorn (their wool shaved off) in spring, in general once a year. It can happen that sheep are shorn twice a year, because in the first months the wool grows back particularly quickly.

Food: Sheep are herbivores that are characterised like cows by their ruminants' digestive system consisting of four stomachs, the rumen, the reticulum, the omasum, the abomasum. The rumen on its own can contain up to 30 l of food.

For the older ones:

A ruminant's stomach consists of several compartments (4: the rumen, the reticulum, the omasum, the abomasum) which allow it to digest the toughest of foods.

First the food is roughly swallowed. It falls into one of the compartments of the stomach, the rumen. The microbial population contained in this compartment help to digest the food.

The food then comes back up into the mouth to be chewed again. In this way the rumen will absorb 80% of the food ingested. What remains will be transformed in the abomasum, another compartment, thanks to the gastric juices it contains.

Reproduction: Sheep reproduce once a year. The ewe carries her lambs for 150 days on average and can easily raise two, and even three young.

#### Ouessant sheep

This Breton breed existed on the island of Ouessant until about the 1930s. In 1976, there were only about 200 to 300 animals left on a few private properties.

Since 1995, thanks to an association (GEMO) OUESSANT SHEEP are being kept all over France, Belgium and Holland.

## **THE GOAT FAMILY**

The goat

The goat is a very efficient animal, it can adapt to any topography thanks to its lightness and surefootedness. It can resist the cold of the mountains and the heat of summer. It efficiently turns grass into milk.

An alpine goat weighing 60 kg produces 850 litres, or 14,1 litres per kg. It can eat all kinds of plants and therefore has a role as a land clearer and in the use of poor quality land. The composition of its milk is closer to human milk than cow's milk. Its cheeses are more easily digested and less fatty.

These qualities make it animal particularly suited to developing countries.

Food: The goat is a ruminant, a goat ruminates from the age of three weeks (when it starts to consume solid food), and generally it will lie down to ruminate. Goats consume grass, leaves, brambles, good quality hay. We also give them cereals (barley, maize...) or special granules.

The goat drinks little, but we must ensure that it has plenty of clean water available.

Reproduction: The female goat general gives birth to two kids after 5 months gestation. If a third kid is born, we bottle feed it, for its mother will not have

enough milk and unlike the cow she only has 2 teats.

A few words about the dad, the ... billy-goat, who has a reputation for stinking, and it is true, he stinks! But contrary to what some people say, this is not his urine, but small glands between his horns that secrete this "delicate" odour. But why? To please the girls, of course. And of course, the smell is especially "explosive" during the mating season.

***To come back to the horse family:*** Dolly the pony and Reglisse the mule. What is a mule? The mule is an animal in the Equidae or horse family. It is a cross between a donkey and a mare.

For the older ones: Hybridisation is the crossing of two species from the same genus or of two species from different genres (for example, in the horse family, the genus Equus with the genus Asinus), which is not always easy in the animal world.

Hybridisation is rarely natural and spontaneous. Most of the time, it is the result of human intervention, voluntary or involuntary.

For the case of the genus Equus with the genus Asinus, two crosses or hybridisations are possible. When the male is a donkey and the female a mare, the product is called a mule.

In the opposite case, a male horse and a female donkey give a hinny.

## **THE DONKEYS Bianco and Huguette**

Smaller than the horse, the donkey has longer ears.

The coat is generally grey on the abdomen, the muzzle and around the eyes are white, but some domestic breeds may be predominantly black, like the black Berry donkey, or brown, like the Poitou Mulassier donkey.

The grey breeds also have a black cross on their backs known as "St. Andrew's cross".

The domestic donkey had the same functions as the horse, but it was cheaper to keep as it was not very demanding as regards its food; the poorest peasants preferred it to the horse, hence its nickname "the poor man's horse".

Moreover, the donkey can move about in very steep places, so it was used for transporting heavy goods to cabins high up in the hills.

The donkey brays.

### **The manure heap**

The smells (billy-goat, the farm in general, manure...) are not "dirty" smells, but "natural" smells.

Where the manure is well kept, there are plentiful harvests. On a farm, the fertilising material that comes from animals' bedding not wasted.

Thanks to manure, heavy soils become more pliable and light soils have more binding and more consistency.

For the older ones:

We must not forget that good farm manure is the first fertilisers and the most solid foundation of productive agriculture. It is what gives the humus, the main ingredient in compost, which plays a very important chemical role in the soil as it is the main source of nitrates, an essential nutrient of plants.

The manure is placed next to stables. It must not be washed by rainwater. It must not be dried by the sun or strong winds.

The manure must rest on cement, so that there is no infiltration into the ground.

The slurry (the liquid coming from the manure) is collected in a tank situated behind the manure heap.

The slurry ferments and gradually becomes richer. It is used to fertilise the crops, it encourages enormously the growth of grass and plants in general.

It should be mixed with 4 or 5 times its volume of water before being spread to prevent it burning the crop.

### **The small members of the camel family**

The Alpaga and the Lama are small domestic members of the Camelidae camel family, the same family as the camel and dromedary the which are classified as large Camelidae. They originate from South America (Chile-Peru).

#### **The lama**

Description: The lama is a mammal mainly sandy beige in colour, but which may have some black spots or be totally black or brown. It has 30 teeth.

Its tongue is very wet with saliva and its stomach ruminates. It loves to spit but only does it to defend itself.

Lifestyle: The female generally lives in a small group with a male. It is viviparous like most mammals. It can survive without water and food longer than most other animals.

Food: The Lama is herbivorous, which means that it eats only grass and leaves. In its natural habitat it eats 2 kg to 3 kg of leaves a day.

#### **The alpaga**

The adult Alpaga measures about 90 cm at the withers and approximately 150 cm to the tip of the ears.

An adult female weighs about 60 kg and a male 70

to 75 kg.

Its reproductive cycle is slow: a gestation period of 11 ½ months and only one baby is born which is known as a cria and weaned at about 6 months.

Its wool is very fine and of very high quality. Alpagas may be shorn every year, but the fleece can be left to grow for 2 or even 3 years.

Colours: white, apricot, brown, red, black, two-coloured, three-coloured. Its life expectancy is about twenty years.

It is a pet animal that is kept for company and decoration. It is very calm and gentle.

It is a very curious animal and very intelligent. They communicate with each other by means of a very discreet humming.

The Alpaga is not aggressive to people or other animals, it can easily cohabit. It will not try to escape and will not damage the bark of trees.

### **THE PIG FAMILY**

#### **The pig**

Descends from the domestic boar. It is an ungulate, and has four toes with a hoof. It has a short, curly tail.

The adult female is the sow,  
the young female bred for reproduction is a gilt  
the young male is the boar  
the young pig (before weaning) is called a piglet or feeder pig (or suckling pig in the plate)

The pig is omnivorous, it eats everything. It rapidly transforms waste into food and of course into excellent meat. We all know the saying: "every part of the pig is good to eat".

The pig also provides fat, lard.

Its bristles are used to make paintbrushes.

Its skin provides leather that is used to make clothing, shoes and various leather goods.

The pig is also used for its flair to find truffles. It is sometimes, but rarely, a pet, cleaner than you might think when the conditions in which it is kept allow it.

For the older ones:

Its anatomical and biological constitution close to that of man and the ease with which it is bred, mean that the pig is used in medical research and in therapeutic applications: cardiac surgery, production of insulin, heparin against hypertension, pigskin for the treatment of burns victims, etc.

#### **Bovines** (none at the Naïades)

For the moment we do not have any calves or cows at the NAÏADES.

## THE LIFE OF THE ANIMALS

### They feed, they reproduce

#### Reproduction and the hen's egg:

The hen lays 8 months per year, approximately one egg a day (or about 300 eggs per year). She can lay about 10 eggs before starting to sit. She will sit for 21 days. When she is sitting, the hen has a fever and sweats.

The young are born by tapping on the eggshell to break it with their beaks. The hen does not feed her young. They eat grain, small worms and insects.

Hens may lay eggs without shells if they are not getting enough calcium in their diet.

You can see how an egg develops on the boards next to the hen house.

For the older ones:

Furthermore, the eggshell is a ceramic formed at low temperature which has remarkable mechanical properties. In fact a hen egg can resist 3 kg of static pressure for a shell thickness of 0.33 mm.

### They move about

The goats are agile and skip,

In their natural habitat sheep are capable making long trips accompanied by the shepherd.

In the pigsty, the pigs are less agile and they like to walk in the mud; they are very uncomfortable on a clean floor

### They communicate

The communication and behaviour of animals are lined to the search for food. They communicate by cries, by smell.

The animals present here are domesticated. There is a code between the animal and the farmer or here the animal keeper. They try to attract our attention by approaching a fence, they may whinny or bray...

The presence of man means food, stroking, possibly a change of habitat.

The members of the horse family keep their

distance, they are preoccupied by their own relations, they may nibble each other's necks or kick out at each other.

For the goose for example, it may open its beak, put out its tongue, whistle whilst spreading its wings, an attitude which keeps away nuisances.

## THE LIFE OF THE FARMER

### Maintenance

He prepares the shelters, fills the troughs, replaces bedding...

He provides his animals with suitable feed....

### He takes care of the sanitary aspect of things:

He disinfects the enclosures, the tools used, he ensures that the animals' feet are disinfected...

### Monitoring by the veterinary surgeon

The veterinary records of each animal are kept in a file, there is one sheet per animal.

The sheet is a record of the animal's life in which everything is noted, its feed, its health problems, its vaccinations....

The vet comes by regularly to vaccinate or treat the animals whenever it is necessary.