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The influence of the breeding method on the behaviour of adult African grey parrots

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To the African grey parrots' welfare



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1 INTRODUCTION

1.1 GOALS OF THE STUDY

The purpose of the study was to see how hand-reared, parent-bred and wild-caught African grey parrots kept as pets differ in their behaviour. The hand-raised parrots were also divided into several categories in order to examine the influence of the different hand-rearing methods on the birds' behaviour once adult.

Nowadays, African grey parrots can easily be successfully bred in captivity and are very commonly kept as companion animals all over the world. Parrot breeders rear chicks by hand more and more often as a matter of course although they have no obligation to do so. However, the exact consequences of the different hand-rearing methods have never been studied and still remain unknown. Knowledge of the early development of the African grey parrots' behaviour is very limited and it is still not clear how long the sensitive stage, during which the birds are imprinted on one specific species, lasts. Still, the development of the chicks' normal behaviour seems to go beyond their nesting period and to involve many components that have to be learned by interaction with parrots and observation of other individuals in the flock.

For instance, the importance of the sibling relationship was demonstrated by Wanker in the case of spectacled parrotlets. Individuals that grew up without any nest mates were able to socialize successfully only when they established a sibling-like relationship with a neighbouring "host-sibling group". In the wild, several neighbouring breeding pairs of spectacled parrotlets assemble their offspring in the same tree on which they establish a sort of kindergarten. Besides, this behaviour could also be observed in budgerigars (*Melopsittacus undulatus*) and galahs (*Eolophus roseicapillus*). This led them to conclude that early bonds between birds are very important for their social development, analogue to primates (Wanker, 1996).

1.2 PROJECT DESCRIPTION

To the authors' knowledge, this study is the first one that has been carried out about the influence of hand-rearing on the behaviour of psittacine birds. Consequently, it had to be done in a rather general manner, so as to find out what aspects of the birds' behaviour and health could be affected by early experiences and imprinting of the birds. An experiment with parrots kept in a standardized environment would have been more accurate, as it would have ruled out many of the influences due to the housing, the care and the social interactions of the birds. Unfortunately, such an experiment was not feasible with the means at our disposal. But on the other hand, the lack of standardization of the study disclosed very interesting results related to the housing and to other confounders considered in this work.

A questionnaire was made in order to evaluate the behaviour, but also the care, the housing, the social interactions and the health of the parrots. Owners of mature African grey parrots kept as pets were interviewed using the questionnaire (see chapter 6.1, 6.2 for details).

2 THE BIOLOGY AND ETHOLOGY OF AFRICAN GREY PARROTS

2.1 IDENTIFICATION, DISTRIBUTION AND ECOLOGY OF *PSITTACUS ERITHACUS*

Identification: African grey parrots are divided into two subspecies: *Psittacus erithacus erithacus* and *Psittacus erithacus timneh*. The nominate form is a large grey parrot (length 33 cm) with a short bright scarlet tail (darker red when immature). Its upperwing coverts and breast are slate-grey, its belly and rump silvery, its bill is black and its iris yellow (grey when immature). It has got a white bare facial area with some white hairs and its legs are dark grey. There is no sexual dimorphism on the plumage (Juniper and Parr, 1998). Timnehs are smaller and darker than the nominate form, with a reddish black-tipped upper mandible.

Distribution: African grey parrots live in West and Central Africa. They are common where large tracts of forests persist (e.g. the Congo basin rainforests). However, due to extensive forest loss and trapping on a massive scale, there have been drastic declines in some places (Juniper and Parr, 1998).

Ecology: grey parrots are diurnal birds. They live mainly in lowland (max 2200 m. alt.) tropical rainforests, clearings, gallery forests and mangroves. They are gregarious birds, forming large communal roosts of up to 10,000 individuals (Juniper and Parr, 1998).

2.2 NORMAL BEHAVIOUR

The following text is general and is not meant to be exhaustive. Some behavioural patterns have been observed in studies of other parrot species and have not been described in grey parrots yet. Besides, as studies on parrots' normal behaviour have usually been carried out in captivity, these statements should be weighed up with precaution. Very little is known about the behaviour of African grey parrots in their natural habitat and there is no ethogram for that species available yet.

2.2.1 ROOSTING AND DAY ACTIVITY

Roosting sites are located in tall palms or trees either near water or on islands in the middle of rivers, where the whole flock gathers to spend the night (Juniper and Parr, 1998). Grey parrots live in single-species flocks contrary to many other parrot species. This means that they allow no other species to co-mingle with their flock (May, 2002; Hallander, 2000).

Feather preening and stretching (comfort behaviour) take place at dawn, in small groups of up to 12 birds. The morning is the most active period of the day. The parrots forage in fruit trees in mangroves, along the savannah woodlands and on the ground in smaller groups, in couples or even alone (Lepperhoff, 2003). Midday is resting time for most birds and a second activity peak takes place during the afternoon. The flock in which can live hundreds of birds (up to 800) screeches loudly before dusk and gathers in trees to spend the night (May, 2002).

2.2.2 LOCOMOTION

Walking: when parrots walk on branches, they can sidle (one foot cautiously shifted sideways away from the other) or walk in the same direction as the branch with their bodies in line with it which is a quicker walk (one foot placed before the other). All parrots grasp the branch with a zygodactyl grip (two toes pointed forward and two backwards). When walking on the ground, their gait is pigeon-toed and therefore appears to be clumsy. To climb, African grey parrots go by preference directly upwards. Their bill is usually used to grasp the branch as a third climbing-tool (Lantermann, 1999).

Flight: it is the most common way of moving for grey parrots. Their flight is fast and direct. When flying at a normal speed, they flap their wings 5 times/second. The maximal speed reaches 63 to 72 km/h (measured on a 300 metre run) (Low, 2001). African grey parrots often fly over the forest canopy (100 m above the ground), crying loudly. They show their intention to fly by stretching their necks in the flight direction, lifting their wings and flattening the feathers on their bodies.

2.2.3 FORAGING

Feeding habits: food is generally gathered by climbing among the branches of trees. Grey parrots disperse in smaller groups for feeding. Very little is known about their feeding habits, though they are considered to be food specialists (at least partially) (Lantermann, 2000). They have been observed eating maize crops, the flesh of oil-palm (*elaeis guineensis*), nuts, flowers, stems, leaves, roots, berries, fruit and seeds of *figus*, *raphia*, *heisteria*, *dacryodes*, *petersianthus*, *combrelium*, *maracanga*, *harungano*, *ceiba*, *blighia*, *bombax*, *celtis*, *caccia*, *pariah*, *terminalia*, *prunus*, *cola* *tragacanth* (Juniper and Parr, 1998), and *oldenlandia lanciflora* (Ngenyi, 2002). The possibility for grey parrots of eating animal food cannot be ruled out.

They ground-forage as well which gives them the opportunity to eat minerals and soil (geophagy), but the entire flock is never on the ground at once (May, 2002). Seeds are hulled and the biggest seeds are chewed into smaller pieces before being swallowed, while smaller seeds are usually swallowed whole. Bigger chunks are held with the claws and torn apart with the bill. Parrots always carefully peel off the skin of fruit before eating it.

Water consumption: water is collected with the tip of the parrot's tongue. The parrot swallows it by pressing its tongue onto its palate. Grey parrots, unlike other species (e.g. cockatoos), do not need to tip their heads back in order to swallow.

Use of tools: objects (e.g. twigs) can be used to preen and stroke parts of the bird's head. Hollow things can be used for water or food consumption. The use of tools in order to dig has already been observed (Boswall in Lantermann, 1999).

2.2.4 COMFORT BEHAVIOUR

Preening: parrots rub their heads against the preen gland at the base of the tail before taking the feathers one by one with the bill, nibbling and cleaning them thanks to their movable tongues. They need much more time to preen their down than to preen their bigger feathers. The plumage is usually fluffed after preening. The foot and claw care is also part of autopreening. It is performed with the parrot's bill. Grey parrots seem to have the same probability of being left- or right-handed (wacławski, 1993).

Bill care: this takes place most of the time after the parrot has eaten, by performing wiping movements against a branch. When residual food sticks onto the beak, parrots raise a foot and try to

use it to remove the bits of food with rubbing movements. According to Weinhold, bill rubbing is also part of the agonistic behaviour of amazons (Weinhold, 1998). Creaking and grinding noises result from the lower mandible vibrating against the upper one. The birds usually grind their bills just before going to sleep, when they feel calm and contented.

Plumage puffed out: this is carried out when parrots feel relaxed. The plumage is puffed out particularly around the head and neck. A quivering chest is usually a sign of satisfaction (Wright, 2001).

Scratching: this is usually done during preening. Grey parrots scratch their heads with one foot pulled forward under the wing (parrots of some other species stretch a foot backwards over the wing in order to reach their heads). Parrots can scratch their napes when in a conflict situation and as a displacement activity, especially during courtship and strutting (Lantermann, 1999).

Stretching: one or both wings are stretched downwards towards the tail of the bird. The leg on the same side as the outstretched wing is simultaneously stretched backwards. The corresponding half-tail is fanned out. Another way of stretching is that one or both wings are raised over the back of the parrot. Neck stretching and bill opening ("yawning") must be interpreted as stretching movements of neck and beak parts or as an attempt to dislodge a feather that is stuck in the parrot's ear.

Resting and sleeping: the birds usually roost on one foot on very high branches, with light dishevelled plumage, their heads turned in under a wing with their eyes closed. Immature birds, until a few months old, usually roost on both feet.

Bathing: grey parrots enjoy bathing. Brooding females bathe quite often, particularly on rainy days, to dampen their plumage so that the chicks can easily hatch out of the humidified eggs.

Defecating: this is often done before flying. The plumage is usually fluffed afterwards.

2.2.5 SOCIAL INTERACTIONS

A) Vocalization

Grey parrots are very vocal. In the wild, they usually call during their flight (Lepperhoff, 2003). Several different sorts of calls can be differentiated, including mimicry of other birds and mammals: squawks, shrieks, chirps, whistling, honking-like and melodious flute-like noises (Juniper and Parr, 1998). Those sounds have several meanings, thus: they are used as contact calls between members of the flock, to show an aggressive demeanour towards rival parrots, for comprehension within the couple, to feed their offspring or to signal an alarm when they feel threatened by an enemy (with a penetrating and harsh screech) (Lantermann, 1999). The cawing of grey parrots is a sign of great fear. A low guttural noise can be heard in captivity, when parrots are restrained and feel oppressed.

B) Mechanically produced sounds

Many parrots of different species (including grey parrots) often repetitively knock their bills on surfaces, usually during courtship. Besides, beak clicking is a sharp "clicking" sound used when a bird is feeling threatened or is defending its territory. It also seems to contribute to maintain the pair-bond (Lantermann, 1999).

C) Visual signalling (body posture and facial expression)

Visual signalling is a very important means of expression between members of the flock as well as between different parrot species. The birds have a choice of several different ways to demonstrate their emotional state:

- The possibility to puff out their feathers on their heads and necks (agonistic behaviour), equivalent to the erectile crests of cockatoos and cockatiels.
- The contraction of the pupil, called eye pinning which is mainly done by males or dominant birds. It shows excitation during courtship and strutting and is also part of aggressive behaviour.
- Hiding the bill in the cheek feathers (fan face): it shows the rest of the flock that there is no danger or threat at the moment.
- Although yawning belongs first of all to comfort behaviour, it probably has another meaning as a way of expression (Lantermann, 1999).

D) Interspecific understanding

The behaviour of different parrot species is similar enough (even between two genetically remote species), to allow them to understand basic behavioural patterns of other species. However, such an association between birds belonging to different species must be interpreted as a substitute to normal social interactions (Lantermann, 1999).

E) Agonistic behaviour

Agonistic behaviour consists of threats, attacks, arousal, appeasement and flight. Serious fights and injuries are quite seldom seen among parrots. The application of a social hierarchy and a precise body language are useful to limit serious acts of aggression between members of a flock. However, threat, attack and appeasement gestures happen increasingly during the rearing of the chicks and the mating season (Weinhold, 1998; Lantermann, 1999).

Hierarchy

Woppel studied the social structure and the rank order of 13 grey parrots kept in an aviary. She discovered that African grey parrots have a non-linear dominance hierarchy, like the one found in keas (*Nestor notabilis*), primates and many female ungulates. That non-linear system includes dominance interactions that are often circular and entangled in very complex ways. Male African grey parrots are not only more aggressive than females, but also have a higher position in the hierarchy (Woppel, 2003).

Threats basically take place from socially higher ranked parrots and between parrots that differ a lot in their hierarchy position. The defence of the territory in the case of grey parrots is less intensive and developed than in amazons. Aggressive behaviour with physical contact mainly happens within a couple and between members of the flock that have a similar social status. Under certain circumstances, monomorphic parrot species (such as African grey parrots) might recognize the sex of other members of the flock only thanks to their level of aggressiveness (Lantermann, 1999).

Threats and attacks

Threat: plumage puffed out, wings raised and spread slightly, staring look with eyes pinning and tail fanning. Arousal (strutting and posturing) is very similar or even identical to the weakest form of threat.

Beak wrestling: the parrots try to grab and strike each other's beak, head or shoulder. This behaviour is preceded by a long-lasting posture with the beak remaining wide open.

Aggressive stance: parrots stretch their bowed heads, puff out their plumage (extreme in grey parrots, that look like a "feather-ball") and stay in that position.

Aggressive walk (lunge): parrots run towards their adversaries with their neck feathers puffed out, swaying with their heads bowed, then they push their rivals with their beaks closed, usually supplanting their adversaries. Though the aggressive walk was first described concerning amazons, grey parrots seem to display similar behaviour. Parrots can also supplant their adversaries by flying in their direction, showing their intention to perch where the attacked bird is standing.

Grapple fights: these are the highest degree of aggression and happen very rarely and always between birds that do not know each other. That behaviour might be enhanced by captivity in small cages (Lantermann, 1999).

Defensive, appeasing and submissive behavioural patterns

Defence stance: the parrots sit upright on a branch with their neck feathers puffed out, uttering cries of defence. They usually lean their bodies backwards with their bills open.

Wings lifted: the shoulders are raised 2-3 cm away from the body. This reaction is very often triggered by the opening of the beak of another parrot.

Foot-raising: this must be interpreted as defensive behaviour. It has been described in other parrot species, such as amazons and macaws. The bird lifts its foot up in the other parrot's direction. The attacker interrupts its bill-attack and raises its foot as well. It occasionally comes to "foot wrestling" between the two birds.

Appeasement: the tail feathers are grouped; bill and head are turned aside. The parrots begin preening (as a displacement activity) if the threat has lasted long enough. They then hide their bills in the feathers of the back and close their eyes. The offensive act of the attacker is usually stopped by such behaviour (Lantermann, 1999).

F) Sexual behaviour and affiliative social interactions

Allopreening: this consists of one bird preening the feathers of another (often mutually). Allopreening can be solicited by one parrot lowering its head, facing the other bird.

Allofeeding: one bird (usually the dominant one) gives food to another by regurgitating into its bill. Head bobbing precedes allofeeding. This behaviour helps the couple maintain the pair-bond and is not merely sexually motivated.

Ambivalent sexual behaviour: two males or two females can live as quite a harmonious couple. One of the birds therefore gains the dominant position and the other bird the submissive one. Such a couple usually allopreen, allofeed and even sometimes try to copulate.

Time of intraspecific neutral behaviour: this is the period between the end of the chicks' rearing and the next mating-period. Birds have much less social interaction with other members of the flock during that period. Aggressions are less intense and sexual interactions can scarcely be observed (Zander, 1976 in Lantermann, 1999).

Social groups of subadult birds: grey parrots already live in social groups before their sexual maturity. A kind of pre-partnership can be observed, in which the juveniles perch in contact and allopreen. Those bonds are hardly sexually motivated and can be seen between two males or two females, even when there are enough birds of both sexes among the juveniles (Lantermann, 1999).

Sex-recognition, bond and mating: wild African grey parrots are most probably monogamous. Pairs of grey parrots sometimes breed close to each other in loose colonies of up to several hundreds of pairs, contrary to some new world parrots, that live in couples withdrawn from the rest of the flock during the mating season.

The pre-bonds of subadult birds can lead to an adult long-lasting partnership. When two birds become sexually mature, a very clear hierarchy is developed within the couple (the male is usually the dominant partner) (Lantermann, 1999).

The mating rituals are not very well known in the case of grey parrots. Some displays are quite manifest, for example both birds walk to and fro on a perch with dangling wings, scratch themselves several times with their foot and rub one another's bill. Beak wrestling sometimes takes place which might be a preliminary stage before allofeeding. However, courtship is not very specific: allopreening, regurgitation, strutting and posturing of the male (shoulders raised and slightly spread), tail fan-shaped, neck feathers puffed out, eyes pinning and groaning. There are very few displays which are exclusively shown during the mating ritual. Most behavioural patterns can be seen during the whole year and are simply intensified during the mating period (Lantermann, 1999).

Prospecting for an appropriate nesting site and protecting it: the breeding season varies with the locality (Juniper and Parr, 1998). The parrots (especially the males) become more and more aggressive at the beginning of the mating period. The couples leave the flock and look for a nesting site. The chosen nests are usually in tree-cavities (10 to 30 metres above the ground) and are carefully transformed by the parents and widened with their bills. The sawdust resulting from that process is used as a substrate for the nest.

Copulation, laying eggs, incubation: the male usually needs several attempts to copulate successfully, as the female often repulses her partner. When she is ready, it is the female that triggers the act, in which she gets into a typical submissive position that reminds us of the begging of chicks. The mating ritual is usually displayed by birds that are mating for the first time. Among experienced parrots, the mating process is often incomplete and less intensive, which can lead to spontaneous copulation.

At first the hen sits only a few minutes a day on its eggs, then a few hours and later all night and all day. It usually lays one egg every other day and altogether 4 to 5 eggs. The female begins with the incubation when the second egg has been laid. The laying of the eggs often takes place at dawn or during the afternoon. The male protects the nest with increased aggressiveness and feeds the female through the entry hole of the nest. The incubation of grey parrots' eggs lasts 26-28 days (Lantermann, 1999).

G) The development of the chicks

The hatching and raising of the chicks: noises and peeps can be heard through the shell a few hours before hatching. Both parents feed the nestlings once they have hatched. The peeps of the chicks are first spontaneous. Later on, they are triggered by touch and/or cry of the parents. The chicks are normally fed for the first time the second day of their lives, when their yolk reserve has been entirely used up.

The chicks are born covered with down. Their eyes are wide open as from the 19th day of life. The first primary feathers appear through the skin on the 23rd day. The red tail feathers emerge after 37 days (Lantermann, 2000). The chicks are fully feathered at 7 to 8 weeks of age.

Fledging: the chicks leave the nest as from the 10th week of life. The more baby parrots there are in the brood, the earlier they leave the nest. Single babies stay a few more days in the nest than the normal nesting period. The fledglings roost on a branch close to their nest and progressively learn how to fly.

Gaining independence: the independent food-intake begins after fledging. Young parrots prefer soft fruit and unripe maize. Only then will they begin eating seeds and hard food. They probably learn to hull seeds by imitating older birds. The young birds only use their bills in the beginning; they gradually learn how to hold their food with their feet later on. The fledglings are still fed by the parents at least 4 or 5 more weeks after they have left the nest (Lantermann, 1999).

H) Games

Individual games: hanging (sometimes upside down) with gesticulating and swinging movements can sometimes be observed. Games using objects are also widespread among parrots (Lantermann, 1999).

Social games: such games have been documented especially concerning keas (*Nestor notabilis*), green-winged macaws (*Ara chloroptera*) and blue-fronted amazons (*Amazona aestiva*). Most of the time, they consist of playful fights in which the parrots tussle with their bills wide open (Weinhold, 1998).

I) Threats of African grey parrots in the wild

The grey parrots' enemies are essentially human beings. Local communities used to eat their meat, they also gathered their red tail feathers in order to make head ornaments and used them in spells (Luft, 1994). However, nowadays the most serious threat for African grey parrots in the wild is their massive capture for the pet trade. Two different methods are used to capture grey parrots: either lime is applied to branches and a captive subject is placed next to the tree so as to lure the wild parrots, or big nets are stretched in forest clearings. Once the parrots have been captured, they are put into small cases of about 1.5 x 2 m which can contain up to 150 parrots. Then they are transported and put in quarantine. Trappers usually transport the parrots over-night, so as to avoid wildlife law enforcement officers. More than 15,000 birds are trapped each year, half of them dying due to poor handling. Between 1995 and 2000; 205,000 grey parrots were legally exported (for more details, see chapter 3.2) (Ngenyi, 2002).

African grey parrots have very few natural predators. They do not seem to react to the presence of palm-nut vultures (*gypohierax angolensis*) that can often be seen in the bays where the parrots go on the ground to eat soil and plants (May, 2002; Lepperhoff, 2003). Unlike palm-nut vultures, Cassin's hawk-eagles (*spizaetus africanus*) are predators of grey parrots. The parrots all fly away when an eagle approaches the bay (May, 2002).

2.3 FIELD STUDIES ON THE BEHAVIOUR OF PSITTACUS ERITHACUS

So far, very few studies have been carried out on the behaviour of African grey parrots in the wild. Diana May has planned to develop an ethogram for African grey parrots (May, 1996). In previous studies, she observed wild African grey parrot populations and discovered that they go onto the ground in forest clearings in order to eat soil, a behavioural pattern known as geophagy, widely spread in South American parrot species that ingest clay (May, 2002).

Observation of wild subjects seems to be very difficult, as grey parrots are very shy and do not allow human beings to approach them. Besides, they usually perch and roost hidden in the branches of mangroves and fly over the tree canopy, what makes their observation hopeless (Lepperhoff, 2003).

2.4 ADAPTATION ABILITY AND INTELLIGENCE OF GREY PARROTS

African grey parrots are still wild animals, as they have been regularly bred in captivity only since the early eighties. That means that captive birds are genetically identical to the wild population. Considering this and all the behavioural patterns that have been pre-programmed in the birds' brains to enable them to face only certain specific circumstances that they normally encounter in the wild, their adaptation ability is rather good, as they are able to survive and to reproduce in an environment that is totally different from the environment in their natural habitat. However, grey parrots' adaptation ability is limited in terms of time and they often develop behavioural problems in captivity, which also demonstrates their very high sensitivity.

The intelligence of these parrots has been estimated to be comparable to that of a 5-year-old child. In spite of their impressive mental capabilities, most parrots possess the emotional development of a 2 to 3-year-old child. They are therefore emotional and have relatively short attention spans (Pepperberg in Davis, 1991).

Provided that the owners have some patience, grey parrots can become very tame, no matter whether they are housed in pairs or whether they were captured in the wild. If African grey parrots are kept alone over a long period or were hand-reared, they are prone to develop a very strong bond with humans and to consider one specific person as a partner.

As discussed below (see chapter 2.5), Pepperberg proved that her African grey parrot, Alex is able to use an elementary form of language to establish interspecific communication with human beings. Besides, Alex is able to tell the difference between objects of varied shapes and colours, but also to combine several criteria (type of object, shape, colour, consistency) that define one specific item. He is also capable of generalizing and of recognizing two objects that have another appearance but are used for the same purpose. That disclosure demonstrates the great intelligence of African grey parrots. Based on further research, Pepperberg could ascertain that Alex's abilities are similar to those of marine mammals and primates (Pepperberg, 1995).

Preliminary results of several experiments on how grey parrots respond to mirrors and how they use them were published in 1995. The first test led Pepperberg to conclude that grey parrots (at least the two subjects used in that experiment) do not seem to demonstrate mirror self-recognition. However, in a further test, the subjects indeed seemed to realize that the mirror was reflecting an image of a real object. In that test, the parrots successfully used mirrors to locate hidden objects whose reflection could be seen in the mirrors (Pepperberg, 1995).

2.5 MIMICRY ABILITY

African grey parrots also reproduce sounds in their natural habitat. Cruickshank provided the first published evidence of vocal mimicry of nine bird species and a bat done by African grey parrots in the wild (Cruickshank, 1993). The function of mimicking sounds in the wild is not quite clear yet. It is assumed to contribute to the intraspecific comprehension of the birds. That is important in the first place for species that live in areas where the vegetation is very dense, in which communication between parrots is only possible using vocalization. The mimicry of the voice of the parrot's partner could be used by the bird to distinguish the right individual from other parrots in the tumult of the flock.

There are other known cases of parrots imitating the vocalization of other species in the wild in order to communicate with them (e.g. to warn them of an imminent threat). Some species also use their mimicry ability to reproduce the sound of a predator to delude other members of the flock and so to gain access to food resources (Lantermann, 2000).

Pepperberg has proved (using the model/rival technique) the ability of her grey parrot, named Alex, to label more than 50 representative types of objects or materials, seven colours, five shapes, quantities from 1 to 6, the material, the colour and the shape of objects, and to use "no", "come here", "want to go X", and "want Y". Alex combines labels to identify, classify, request, or refuse approximately 100 items, and to alter his environment (Pepperberg, 2004).

Grey parrots are the only parrot species which are able to reach all five steps of the scale of vocal mimicry ability conceived by Horst Schmidt. Those five steps comprehend (Schmidt in Lantermann, 2000):

1. simple sound mimicry,
2. ability in transposing and varying,
3. mimicry related to specific situations,
4. expedient "talking" to satisfy its needs,
5. anticipation of expected and/or desired events by appropriate sound expression.

3 ORIGIN AND PURCHASE OF THE BIRD

3.1 THE CHOICE OF AN AFRICAN GREY PARROT

Most of the time, people do not choose that particular parrot species because of its specific ethological traits. At the time of purchase, they do not realize that grey parrots are extremely sensitive and shy birds which react to sudden changes in their environment first with fear or flight and only then with curiosity. Their inclination to develop conservative habits for food as well as for their environment (including for their social contacts) is often unknown by the bird keeper, too.

The first thought that crosses everybody's mind is the grey parrots' very well known ability to reproduce many sounds and the human voice (with the precise pitch specific to each person) better than most other parrot species. Another reason why grey parrots are popular is their great ability to become tame. Thus they are regarded as long-living "companion birds". Unfortunately, their high social needs of conspecifics are seldom understood or taken into consideration and those parrots are therefore too often kept alone.

3.2 WILD-CAUGHT PARROTS

3.2.1 LEGISLATION, TRADE

The African Grey parrot is listed as a protected species in Appendix II (EC Regulation Annex B) of the Convention on International Trade in Endangered Species (CITES). The parrot species second most commonly captured for international trade is the African grey parrot (after the Senegal parrot (*Poicephalus senegalus*) which is the most imported species) (May, 2002). In 1990, in Germany, grey parrots (belonging to both subspecies) were the most imported parrot species. In that year, 7305 African grey parrots were imported into Germany. That figure represented 20.5% of the total importation into that country (Hummel, 1996). 346,782 grey parrots were exported from more than 20 countries between 1983 and 1989. Moreover, many parrots are smuggled. According to a smuggler from Ghana, 20,000 grey parrots are illegally exported each year over the border of Ivory Coast and another 13,000 birds are smuggled over the border of Togo. Many tricks are used by the smugglers, like falsifying CITES certificates or declaring the captured birds as captive bred individuals (Currey, 1994).

Cameroon is one of the biggest exporters of African grey parrots today. In 1997, CITES suspended all export of grey parrots from that country, as their quota for 1996 had been exceeded by almost 100%. In spite of the prohibition that year, trappers continued to capture grey parrots. The annual quota of exportation for Cameroon is 12,000 African grey parrots, but each year more than 15,000 are exported (Ngenyi, 2002).

Among the 241 parrots that were imported into Switzerland in 2001, 26 birds were African grey parrots (Althaus *et al.*, 2003). The conditions of importation of psittacine birds into Switzerland were written in October 1989 and revised in December 2002. Those conditions apply to wild-caught parrots as well as to captive bred birds. An authorization from the Swiss Federal Veterinary Office is required for every importation. At the most, 30 African grey parrots per sending are allowed and during the quarantine, not more than three grey parrots per m³ are authorized. All the birds that are still not ringed when entering Switzerland have to be ringed at the border. The quarantine must last at least 4 weeks. During that time, the parrots have to be examined at least twice and samples have to be taken and checked on psittacosis. In case of psittacosis, the birds have either to be treated with antibiotics or to

be put to death if the costs for the treatment are considered to be too high by the importer (BVET, 2002).

3.2.2 TRAPPING METHODS

Two methods are used to capture adult African greys: nets and lime-twigs. Both methods take advantage of the fact that grey parrots ground forage in forest clearings. They are both considerably damaging for the birds (May, 2002).

Nets are stretched on the ground and a mechanism can be set off in order to fold it over the birds and restrain them in the mesh. This method is very efficient and trappers can usually capture about 50 parrots each time. Nevertheless, the birds can easily be injured when this method is applied. Since as many grey parrots as possible are caught simultaneously, it takes a long time for the trappers to transfer them into the crates. During that time, the birds may peck and hurt each other. The parrots can also be injured by the trappers due to poor handling. The trappers usually hold the birds by the tip of their wings and when the birds try to bite them, they are tossed and given a jerk in order to make them stop. They are sometimes also hit on the head with a stick to prevent them from escaping from the case by climbing out of it (May, 2002).

The traditional method which consists of using lime-twigs (twigs spread with birdlime) and luring wild parrots with a tame bird tied up next to the branch is easier to apply, though it is much less efficient. This method can also harm the parrots. Some birds that have their flight feathers glued can indeed escape but cannot fly any more. They are then exposed to certain death, as they can easily be attacked by predators on the ground or as they die of starvation (May, 2002).

A third technique which is used to catch baby parrots is to fell trees on which nests are located. The chicks are removed from the nests and are then hand-raised by the local population, during which time they are often kept in appalling conditions. Nest sites are destroyed in this way. Besides, some chicks do not survive the falling of the tree on the ground.

3.2.3 MORTALITY BETWEEN CAPTURE AND FINAL DELIVERY TO THE OWNERS

The mortality of African grey parrots between their capture and their sale at the wholesalers' is very difficult to estimate. The route captured African grey parrots have to follow before arriving at the owners' can be divided into four sections: a) pre-transport (situation in the country of export, transport, and storage), b) transport, c) temporary stay at the wholesalers' in the country of import and d) sale. It is supposed that the highest mortality can be expected in pre-transport and at the owners' (Vinke, 1998). A high mortality rate in pre-transport is caused by improper systems and mechanisms used to trap the animals, rough handling, bad transport and inappropriate storage in the countries of origin; there is often no consideration of species-specific needs and behaviour. During transport and temporary storage in the country of import (in this case the Netherlands), traders estimate the average mortality to be between 1 and 3% (Vinke, 1998).

According to Luft, the mortality rate during quarantine in the countries of import varies between 10 and 100%. Besides, 40 to 80% of the captured nestlings which are taken from their parents in order to be hand-raised die before being exported (Luft, 1994).

3.3 BREEDING AFRICAN GREY PARROTS

African grey parrots have commonly been bred in captivity for about 25 years. The first successful attempts to reproduce the nominate form of African grey parrots in European countries were in France in 1799, then in England in 1843, in Germany in 1899 and in the USSR in 1971 (De Grahl, 1991).

One of the most important conditions essential for the breeding of grey parrots is that the pairs must be well-suited and harmonious. Therefore, it is important for both birds to be approximately the same age (Lantermann, 2000). Friendship is a fundamental condition for grey parrots in order to form a harmonious couple. The easiest way to have a successful breeding pair is to observe the parrots' behaviour in the flock and to choose a preformed couple. As a matter of fact, African grey parrots usually choose their partner when they are as young as 2 years old and soon begin displaying courtship behaviour. Nevertheless, they seldom reproduce before the age of 5 (De Grahl, 1991).

3.4 HAND-REARED PARROTS

Hand-rearing has been increasingly carried out over the last 25 years. Nowadays, thanks to innovative ready-to-use feeding formulas, to previous experience in that field gathered by numerous breeders and to high technology equipment, hand-rearing is much easier to accomplish. For instance, in April 1999, 25% of the African grey parrots in the small ads of a German monthly magazine about parrots had been hand-reared (Sistermann, 2000). In the USA, most parrots that are bred to supply the pet trade are systematically hand-reared.

3.4.1 REASONS FOR HAND-REARING

There are several different reasons why breeders decide to hand rear parrots. One of them is that the breeding pair does not look after its clutch properly. This is often the case when parents have no experience in breeding and rear chicks for the first time. Every breeding pair should have the opportunity to learn how to rear chicks. Even though their first attempt is often inconclusive, they should be allowed to learn from their mistakes. They usually take care of their second clutch very well. However, some parents never look after their offspring properly and keep making the same mistakes over and over again.

Breeding problems can occur at different stages of the development of the young and can concern many aspects of the breeding process:

- The parents may eat their eggs just after having laid them (Wagner, 1999).
- The breeding pair fails to feed their chicks at all (seldom) or does not feed them enough, which is fairly common (Low, 1987; Wagner, 1999; Reinschmidt, 2000).
- Only certain birds of the clutch are fed by the parents (Wagner, 1999).
- A very common cause of death for many species is when chicks hatch during cold weather; the parents sometimes cease to brood before they have acquired enough down or feathers to survive (Low, 1987).
- A considerable concern for many breeders is feather-plucking of chicks by one or both parents; in severe cases, the growth of the feathers is affected for the rest of the parrots' lives (Low, 1987; Wagner, 1999; Reinschmidt, 2000).
- Parents attack their young when they fledge; this is most commonly encountered in male cockatoos (Low, 1987).

- Cannibalism may occur when the chicks have been ringed (Wagner, 1999); occasionally, chicks are seriously injured or even killed by the parents (toes, wings or legs being torn off) (Reinschmidt, 2000).

Yet, many breeders remove the clutches from the nests as a matter of course, even when the parents would take care of their offspring perfectly. This is done for two main purposes:

- To supply very tame birds as pets (Low, 1987; Wagner, 1999; Reinschmidt, 2000; Munkes, 2003).
- In order to increase the production of clutches of the breeding pairs. Females whose eggs or chicks have been removed usually lay eggs again within a few weeks (Wagner, 1999; Reinschmidt, 2000). Besides, the parrots that have been hand-reared can be sold at higher prices than wild-caught and parent-reared birds, as hand-rearing is time-consuming for the breeder (Lantermann, 1995; Munkes, 2003).

Other reasons why the breeders choose to rear the chicks by hand are:

- Birds that are slightly crippled, stunted or weak and would not have been able to survive in normal conditions can be saved and sold as pets (Wagner, 1999).
- To increase the number of rare and endangered species in captivity as quickly as possible; the female lays again, mostly within three weeks (Low, 1987).
- Another potential problem that might occur, but seldom does, is the death or illness of the parent(s) (Low, 1987; Reinschmidt, 2000).
- In tropical and sub-tropical climates, predators and biting insects (e.g. snakes and ants) can also cause the death of chicks in the nest (Low, 1987).

3.4.2 REASONS AGAINST HAND-REARING

However, there are several arguments against hand-rearing parrots which are enumerated below:

- The chicks are imprinted on human beings, especially when they have been kept alone during the nesting-period (Wagner, 1999).
- Under certain circumstances, hand-reared parrots can become incompetent parents (Wagner, 1999).
- Breeding pairs do not have the opportunity to experience how to rear their young, which will probably make the next generations unable to rear their chicks naturally (Wagner, 1999; Sistermann, 2000).
- The chicks (particularly the birds that have been reared isolated from the rest of their clutches) are not well socialized with other African grey parrots (Wagner, 1999).
- Unfortunately, the production of very tame hand-reared parrots for the pet trade may be used as an excuse to keep those highly sociable birds alone (Lantermann, 1995).
- Baby parrots with gene defects do not die prematurely (the natural selection is hindered) (Wagner, 1999).
- Chicks which have been fed with a tube have difficulty in learning how to hull seeds properly (Wagner, 1999).

The breeding behaviour of hand-reared cockatiels (*Nymphicus hollandicus*) was studied and the results showed that hand-rearing has got different influences on the sexual behaviour of males and females. Hand-reared females as compared with parent-reared birds laid their eggs more frequently on the

ground of the aviary, instead of laying them in their nesting-boxes. Interestingly, exclusively breeding pairs involving parent-reared males were able to rear their chicks till they had reached their independence (Myers *et al.*, 1988).

Sistermann demonstrated that hand-reared macaws, African grey parrots and cockatoos have significantly more problems breeding and bonding with conspecifics than birds that have not been hand-reared. The problem that most frequently occurred among parent-reared breeding-pairs was feather-plucking of the chicks by their parents. Interestingly, feather-plucking of the young was not the main problem which could be observed in hand-reared pairs. The main concern with hand-reared parents was their neglecting to feed their offspring (72.4% of the hand-reared grey parrots did not feed their chicks). Besides, unfertilized clutches were found significantly more often in the case of hand-reared parents (Sistermann, 2000).

However, some breeders reported that their hand-reared African grey parrot pairs reproduced very well, asserting that they had less difficulty breeding than wild-caught birds, as they were very tame and did not suffer from stress (Schwarzwälder, 1997). The same statement has been made about other parrot species, for example amazons (Jahn, 2003).

The impaired ability of isolated hand-reared lovebirds to socialize with conspecifics was demonstrated by Preiss and Franck. They hand-reared 3 lovebirds isolated from other birds and from humans and 3 chicks which daily came into contact with the breeder and with other lovebirds. Unlike the birds that had been hand-reared with other parrots and that were all socialized with members of the flock very well, only one bird which had been reared isolated from parrots bonded successfully with a partner (Preiss and Franck, 1974).

3.4.3 ALTERNATIVES TO HAND-REARING

Foster parents

The foster parents must have chicks of a similar age in their nest simultaneously. Besides, they should have experience in breeding and must have been able to rear their offspring successfully. The parrot species used as foster parents should be as close as possible to the chicks' species (Reinschmidt, 2000). For instance, the redrump parakeet (*Psephotus haematonotus*) is known for its exceptional readiness to accept chicks of other species (Low, 1987). If the sort of parrots used as foster parents is smaller than the chicks' species, the latter should be removed for hand-feeding as soon as they outgrow their foster parents (Reinschmidt, 2000; Low, 1987). The young parrots should be kept with birds of the same kind as soon as possible, so as to prevent them from imprinting on the wrong species, which might induce courtship or even copulation with the foster parents' species once adult (Reinschmidt, 2000).

Supplementary feeding

If the parents do not feed their offspring sufficiently (the crops are then seldom full) or when no foster parents are available to rear the chicks, supplementary feeds can be given. The crops must not be filled to capacity, as the chicks should be receptive if the breeding pairs want to feed them. Supplementary feeding usually has the added advantage of producing chicks which are tame (Low, 1987). This technique actually provides the desirable features of both parent-rearing and human-rearing.

Neonatal handling

Some breeders supply tame birds which have become used to human beings by being handled daily during their nesting period. This method works very well if the parents are tame and do not react when the chicks are manipulated. If this is not the case, the whole nesting box should be removed or the access to the nest should be blocked in order to be able to touch the chicks without the parents intervening. In a study, orange-winged amazon parrots were gently handled from 25 days of age until 38 days after they had fledged. The handled chicks were tamer by all measures of tameness and had

significantly lower corticosterone levels in the blood than the birds belonging to the control group. The handling conditioned the birds to be held in a manner that did not appear to be stressful (Collette *et al.*, 2000). Handling parent-raised amazon chicks as little as 2% of the time period up to fledging results in tame fledged chicks. However, if handling is not continued later on, the parrots tend to lose their tameness (Aengus and Millam, 1999).

3.4.4 FEEDING METHODS

The different feeding formulas and the frequency of the feeds will not be discussed here, as there are many reference works on that particular subject (Voren and Jordan, 1992; Low, 1987; Wagner, 1999; Reinschmidt, 2000). The aim of this chapter is to give the reader information about the possible implements used to hand-feed chicks.

Spoon

Special spoons with their sides bent inwards are used. The main advantage of that implement is that it simulates natural feeding by the parents. Besides, spoons are very easy to clean. A disadvantage of spoon-feeding is the danger for the chicks to injure their soft beaks against the edges of the spoon, provoked by the vigorous pumping movements of their necks and heads while eating (Wagner, 1999). Besides, it is a slower method and is less efficient if many chicks have to be fed. Further, the exact food-intake is difficult to estimate as a lot of food is spilt by the birds, which also soils the chicks themselves (Reinschmidt, 2000).

Many people feel that spoon-fed parrots wean more easily than the ones that are fed using syringes. This is probably due to the fact that the chicks taste and swallow the formula before it enters the crop (Voren and Jordan, 1992). When a chick is removed from the nest after its eyes have opened, it will have to be syringe-fed initially (during the first 3 or 4 days) because it will not willingly take food from a spoon (Low, 1987). However, Wagner observed the opposite reaction. He noted that those chicks cannot easily be fed using a syringe and accepted to be fed exclusively with a spoon (Wagner, 1999).

Syringe, pipette or eyedropper

Disposable plastic syringes (without needles) are often used to hand-feed chicks. Syringe feeding is a rather quick and easy method to use. A disadvantage of syringe feeding can also be the danger of the parrots injuring their beaks against the plastic while eating (Wagner, 1999). Besides, the chicks can choke on the food when it is injected too fast into the birds' beaks. Pipettes or eyedroppers are very useful for feeding newly-hatched chicks or very small bird species.

Tube-feeding

The tube is placed on the end of a syringe and goes directly into the crop of the parrot. There are two different sorts of tubes that can be fixed onto syringes. The tubes are either made of soft rubber (catheter) or of metal with a small round ball at the end (called gavage needles) to prevent injuries of the crop. The main advantage of using tubes is that parrots that refuse to eat can rapidly be force-fed (Voren and Jordan, 1992). Besides, it has the advantage of speed. The quantity of food can also be measured very precisely (Reinschmidt, 2000).

However, this hand-feeding procedure has many disadvantages. The main disadvantage is the danger of killing a chick if food enters the windpipe (Low, 1987; Reinschmidt, 2000). Besides, tube-feeding can injure chicks when not done properly. The tubes made of soft rubber can harden after repeated use and may harm the birds and lacerate their mouths or crops. The metal tubes can be very dangerous as it takes very little pressure to force them through the oesophageal wall of the parrots (Voren and

Jordan, 1992). Another drawback is when an oversized tube is pulled out of the crop. A vacuum is then made pulling the inner wall of the crop into the hole at the tip of the tube and perforating the tissue (Wagner, 1999). Tubes are also very difficult to maintain in an irreproachable hygienic condition, as they are very difficult to clean (Reinschmidt, 2000). Last but not least, this technique is the most unnatural one for the birds, as it does not allow chicks to swallow the food (Reinschmidt, 2000).

3.4.5 BROODING

The purpose of this chapter is not to go into details of the rather complicated techniques of hand-rearing baby parrots. It is simply meant to give the reader an overview of the most important principles of brooding chicks. Many criteria are crucial to hand-rear parrots effectively (besides the feeding formulas), such as temperature, humidity and substrate in the brooder.

Most developmental problems that occur in the first ten days of life are related to too low brooding temperatures. On the other hand, babies that are fully feathered are easily stressed by being overheated. Although humidity is a critical factor for successful incubation, it is much less important in the rearing of chicks. Most of the chicks do well if they are maintained at a relative humidity of 40% or above. If the humidity is too high, it will cause premature feather growth at the expense of body size (Voren and Jordan, 1992).

There are different sorts of brooders that can be used, such as human baby incubators, commercially produced chick brooders or fish aquariums.

3.4.6 IMPRINTING

There are two different sorts of processes that can be differentiated: filial imprinting that allows the animals to learn to discriminate between individuals (in order to recognize their mothers) and sexual imprinting which defines the species the animals will choose as sexual partners once adult.

Altricial chicks (like parrots, for example) can sexually imprint on birds of other species if fostered by those birds at appropriate ages (Ten Cate, 1984). Besides, though filial imprinting has been studied mostly in precocial species, it has also been demonstrated in some altricial ones, such as blackbirds (Junco, 1988).

So far, there has been no scientific work either to discover how long the process of imprinting in parrots lasts or to find out whether imprinting in parrots is actually irreversible or not (Lantermann, 1998). However, Aengus and Millam could not state that filial imprinting (in that particular case: tameness in amazons) is predisposed to occur at a particular developmental stage. But if this is the case, they doubt this sensitive phase exists before approximately the 14th day of life because eyes and ears are not open until then (Aengus and Millam, 1999). During imprinting, learning is genetically programmed so that the birds possess specific learning capacities during the sensitive periods.

The most sensitive period, during which the process of imprinting occurs, is probably during the nesting period of the chicks and the juvenile stage which follows it. Nevertheless, some specialists think that a lack of socialization with other parrots is responsible for the incompetence of some hand-reared individuals to breed successfully. They are neither convinced that the imprinting should be blamed for that incapacity nor believe that imprinting in parrots is irreversible (Blanchard, 1997). Unfortunately, these assertions have not been scientifically proved or even studied yet.

The process of imprinting (Munkes, 2002) is characterized by:

- A limited stage of development during which birds learn and gather experiences
- What has been learnt is usually not corrigible
- What has been learnt is strictly defined
- The moment at which the imprinting occurs and the time at which the learned acts are executed do not necessarily have to coincide

Hand-rearing parrots is actually equivalent to making them undergo a deprivation experiment during their development. The parrots do not have the possibility of experiencing certain important things during that period and therefore cannot learn from practice and observation. During hand-rearing, it is impossible for the breeder to reproduce all the stimuli the chicks would be exposed to if they were reared by their parents. Those stimuli concern tactile experiences (during the first days of life), but also visual signals given by the parents as well as vocalization (for example appeasement sounds in amazons) (Munkes, 2002).

3.4.7 THE WEANING PERIOD

Although the offspring leave the nest already at 10 to 11 weeks of age (De Grahl, 1991), grey parrots' young are still fed by their parents after they have fledged and are fully independent only at 4 months of age (De Grahl, 1991) or, according to other breeders, even at 6 months of age (Pinter, 1988).

However, there is no rule about how long the weaning period lasts in parrots. Individuals learn to eat on their own at very different ages. Therefore, the weaning procedure should be thoroughly weighed up and adapted for every single individual when parrots are hand-fed. Chicks should never be force-weaned. It is basically wrong to believe that they learn better to eat on their own when they are starving. This method only enhances stress and insecurity in the birds. Chicks should be hand-fed until they start weaning themselves by walking away from the food syringes.

Sprays of millet, fruit, vegetables and soft corn should be given to the chicks early enough, that is to say at approximately 7 weeks of age, in order to encourage them to taste food. At that age, chicks become active and curious and begin tasting things in their surroundings (Wagner, 1999). A large variety of food should be offered to the bird, so as to accustom it to different sorts of fruit and vegetables.

Parrots are unfortunately very frequently sold to the owners before they are fully weaned. Some breeders claim that the relationship with the owner is much closer if the chick is hand-reared by the bird-keeper. However, that suggestion has been proved to be totally untrue (Low, 1987). Nonetheless, this approach has a not inconsiderable advantage for the breeder. The aviculturist can significantly reduce his/her daily work and avoid the labour-intensive and often tedious changeover from hand-feeding to the birds' independent food-intake (Munkes, 2002). The breeders usually do not have to insist to sell unweaned chicks, as most owners are motivated to feed their cute newly-acquired parrot themselves.

Chicks are at their most vulnerable to changes in their environment as they approach and experience the weaning period (Low, 1987). Besides, hand-feeding is laborious regarding the practical use of the feeding implements and the preparation of the food (temperature and consistency of the food). Many mistakes can be made by the owners during the process of hand-feeding, some of them having disastrous consequences on the parrots' health (e.g. aspiration, burned crop, crop stasis). It is therefore fundamental to leave hand-feeding to specialists, that is to say to the aviculturists themselves (Reinschmidt, 2000).

Independent hand-reared young parrots should always have the opportunity to live in a flock with juvenile and adult birds for a few months before being sold. This is essential for their socialization with conspecifics and allows them to learn behavioural patterns from the observation of other birds. Unfortunately, this is seldom feasible for the breeders for economical reasons and because of the space and organization it would require (Wagner, 1999; Reinschmidt, 2000).

3.5 PARENT-RAISED BIRDS

3.5.1 ADVANTAGES

Parent-reared chicks are imprinted on their own species and are fully socialized with conspecifics. They have the opportunity to learn naturally from observing their parents and their siblings, especially if they are kept with parrots for a few months after fledging. Besides, they display all the species-specific behavioural patterns. The weaning process, which is often a rather tedious period in the birds' lives for the breeders, is undertaken by the parents which know exactly how to proceed and how to teach the nestlings to hull seeds and to become independent. Therefore, there are much fewer oversights or errors during the rearing and weaning of the naturally reared chicks, which also induces considerably fewer behavioural changes later on due to those mistakes.

Parent-reared parrots can become just as tame as hand-reared parrots. Nonetheless, they consider the owners as comrades, but not as partners. Therefore, they have a natural fear of human beings, as they know that we do not belong to the same species. In spite of this, some parent-reared or even wild-caught parrots that are kept alone may consider their owners as surrogate partners after a long period of loneliness.

Breeding their young naturally is in all respects very beneficial for the parents. It provides them with a very good occupation and is a very positive point in their welfare.

3.5.2 DISADVANTAGES

Taming parent-reared grey parrots requires some patience and some time, especially if the grey parrots were bred without any contact with humans and if their parents were not tame. Grey parrots are easily frightened and destabilized and therefore need a lot of positive interactions in order to feel reassured. If not handled properly or calmly enough, they might remain nervous in the presence of human beings.

3.5.3 TAMING PARENT-RAISED PARROTS

When parent-reared parrots have very little positive contact with humans during their early development (nesting period and weaning stage), they are initially wild and scared of human beings. This is especially true when their parents are not tame. In that case, the owners should talk gently to the birds and behave in a very calm and soothing way. Taming should be slow in order to enable the birds to gain self-confidence as well as confidence in the owners. It should be very progressive and the parrots must never be restrained in the owners' hands.

At the breeders', another less invasive method than supplementary feedings can also be applied in order to sell tame parent-reared parrots. It has been documented by breeders of orange-winged amazons. Talking calmly to the chicks while they are still in the nests helps them get used to the

human voice. Besides, in aviaries in which a whole flock of amazons is kept and where the young can stay a while with the adult birds once they have fledged, it is easy to use the birds' innate curiosity in order to tame them. In general, all fledglings want to try what other birds have experienced, for example eating pieces of fruit held in the owners' hands. Within a very short time, the parrots lose their natural fear of human beings. The owner is then considered to be part of the playground and the normal environment of the birds and the fledglings do not hesitate to land or to climb on the breeders (Munkes and Wehe, 2003).

4 BEHAVIOURAL PROBLEMS OF GREY PARROTS

4.1 DEFINITION

4.1.1 NORMAL BEHAVIOUR VERSUS ABNORMAL BEHAVIOUR

There are several disparate definitions of behavioural disorders in parrots, all of them taking into account different aspects of their behaviour. As some definitions complement one another, three of them have been selected and introduced next.

- According to Jupprien, behavioural disorders can be considered as such when the bird suffers from its changed behavioural patterns and/or when reintroduction into the wild can basically be ruled out (Jupprien, 1996).
- Abnormal behaviour is an acquired activity displayed by a physically healthy individual which clearly deviates from the species-specific behavioural patterns. That behaviour is either obsessively repeated or is constant (Kaleta, 2003).
- Behavioural patterns in parrots are considered to be abnormal when they 1) do not have an obvious conservative function (either for the individuals themselves or for the species) within their housing systems as well as in their environments and 2) when they favour or induce physical damage (to themselves or to their counterparts). Most behavioural problems in captive parrots become manifest once the birds have reached their sexual maturity (Lantermann, 1989).

4.2 COMMON BEHAVIOURAL PROBLEMS

4.2.1 BITING, AGGRESSIVE BEHAVIOUR

In the wild, parrots bite or attack each other very seldom. Their body language is very well developed and they use it in order to forewarn other parrots before attacking. As the offensive signals are taken seriously by the rest of the flock, the assailant very seldom needs to strike.

Definition

Increased aggressiveness in parrots can basically be divided into the following: dominance, protective and territorial aggressions (Jupprien, 1996).

However, types of aggressiveness can also be grouped according to their meaning and their implication for the parrots in the wild (Lantermann, 1998):

- Parrots' specific aggressive behaviour. This is the type of aggression which belongs to the normal behavioural patterns of parrots and which can be observed in the wild as well as in captivity.
- Dominance aggressions over the owner. This is especially often seen in amazons that are kept as pets, once they have reached their sexual maturity. At this stage, the parrots bond very closely with one person and attack other people in their surroundings.
- Dominant behaviour towards conspecifics. This demeanour can be seen in captivity and is due to the confined environment in which the parrots are kept without having any possibility of

avoiding conflicts. Dominated parrots are chased along, constantly attacked or even sometimes badly injured by the dominant birds.

- Aggressive behaviour towards immature offspring. This can occur in captivity when the young are still with their parents at the time of the next reproductive season. This is particularly a matter of concern in smaller parrot species that mate several times a year.

The only type of aggressive behaviour that is taking into consideration in this work is the dominance aggression which is relevant in companion parrots and is mainly directed towards human beings.

The difference between a true bite and a nip needs to be pointed out. A real bite makes one bleed or creates a bruise, whereas a nip does not. This nuance was essential in this study and was used in order to evaluate the aggressiveness of the parrots.

Aetiology

Most captive parrots display various body languages and vocalizations before biting. However, many owners do not understand or even notice the birds' warnings. In those situations, the parrots' only way to make themselves understood is to bite the bird-keepers.

In captivity, parrots peck for the following main reasons (Martin, 2002):

- At play: it is natural for the young birds to investigate their environments. The owners are responsible for teaching the birds how hard nipping is allowed to be. On the other hand, juvenile African greys often bite as a reaction to a feeling of insecurity given by the owners when they do not hold the birds firmly enough (Davis, 1991).
- Territorial aggression: parrots can easily learn that biting is the best way to drive human intruders away from their territory.
- Fear aggression: this is associated with survival. In the wild, the parrots would simply fly away whereas most captive birds cannot escape.
- Learned aggression: some parrots learn to bite for a desired response. They can easily be taught by the owners that biting is the most successful way to communicate with human beings.

According to Low, two main causes should be considered separately for biting problems in captive parrots: hand-reared birds often bite to show dominance, while naturally-reared parrots (wild-caught or parent-bred birds) usually bite out of fear. Dominant behaviour and biting are very common concerns for parrots' owners. This behaviour is often encountered among hand-reared parrots which have lost their natural respect of human beings (Low, 2001). Each parrot tries to gain the most dominant position in the human flock. This behaviour is commonly seen in hand-reared birds during their "adolescent" phase, from the 7th to the 11th month of age. The parrots become then more aggressive towards one or all the members of their households (Davis, 1991).

Besides, biting might be triggered by the owner's lack of respect of the parrot's individual distance (Juppien, 1996; Kaleta, 2003). Although Juppien did not have enough aggressive birds in her work to be able to analyse the results using statistics, she found an increased tendency of aggressiveness in male birds, parrots that were kept alone, birds with little occupation (fresh branches seldom provided) and individuals that were kept in an inside aviary (Juppien, 1996). A very intimate attachment to the owners and housing isolated from conspecifics have also been correlated with increased aggressiveness in other studies (Van Hoek and Ten Cate, 1998).

Preventing and correcting

Most of the aggressions can be prevented very easily by reading the birds' body language carefully and by respecting their individual distance. Besides, naturally-reared parrots that are kept in couples are less likely to display aggression.

When a parrot first begins to bite, ignoring this behaviour is often the best thing to do, as it does not reinforce biting. This means that the behaviour is not going to occur more frequently if the owner does not react (Low, 2001). As African grey parrots are very sensitive and fearful, the owner should not react with a jerky movement (Wright, 2001). Parrots are very emphatic animals that watch facial expressions closely. Therefore, they interpret a frown or a dirty look from the owner as being negative, and this can be used to discourage them from biting again (Wilson, 1999). Then, an appropriate type of behaviour should be suggested to the bird in order to replace the undesired activity.

According to Davis, the most effective way of correcting biting consists of holding the bird on one's hand and administering a jolt when it bites. Nevertheless, if the parrot bites because of a feeling of insecurity, jolting could only exacerbate the condition (Davis, 1991).

Almost all behavioural consultants suggest lowering the perches in the cage to prevent a parrot from showing dominant behaviour. The perches should not be placed higher than the owner's chest (Davis, 1991; Wilson, 1999; Kaleta, 2003; Low, 2001). Kaleta also suggests changing the location of the cage, which motivates the bird to explore a new territory that it does not defend yet (Kaleta, 2003).

4.2.2 SCREAMING AND SCREECHING

Definition

Screams and screeches are matters of concern only if they are uttered excessively loudly and frequently (Jupprien, 1996). It can be very difficult to tell the difference between excessive screeching, which is a behavioural problem, and normal screeching, as parrots naturally have very loud voices. For instance, very loud screeches at dawn and dusk are perfectly normal for parrots.

Aetiology

Amazons and cockatoos seem to develop that behaviour more often than African grey parrots. Usually, birds that scream constantly are the ones that have been unwittingly rewarded for screaming by the owner.

Lawton divided screechers into different categories (Lawton, 1996):

- Attention screechers: those parrots screech in order to get the owners' attention. Especially in the case of cockatoos. According to Low, hand-reared parrots often turn out to be very attention-demanding (Low, 2001).
- Happy screechers: the screeches are used as contact calls so as to greet the owners when they come in. Dominant parrots are usually noisier than dominated ones (Lantermann, 1998). The best way to react to that behaviour is to greet the birds back.
- Unhappy screechers: those birds screech out of fear or because of new situations in their lives. Most of the time this is an absolutely normal reaction and is not a behavioural disorder. Therefore, this behaviour usually ceases if the parrot is kept in a very calm and soothing environment.

Low enumerates some additional reasons for excessive screeching and screaming (Low, 2001):

- Turbulent environment: birds that live in a noisy environment tend to become noisy, for example if the television or a loud radio is on all day. In that case, adjustment to the environment can help reduce the problem.
- Communication attempts with the owner as well as communication with other birds if the owner has both an outside and an inside aviary.

Boredom is also a very common cause of screeching. Besides, dominance can also be an important factor contributing to this behaviour (Davis, 1991). The location of the cage can also have an influence on screeching. Parrots that are caged in a room by themselves often scream excessively, as the birds call for the rest of their human "flocks" (Wilson, 1999). Besides, cages that are located next to windows can be a constant stress for the birds which might react with permanent screeching (Wilson, 1999).

Preventing and correcting

The first step that is essential to take in order to correct excessive screeching is to evaluate the bird and its environment and to find out the stimuli and the circumstances that have led to this screeching. Contact calls should be answered by the owner. Attention-demanding screeches should be ignored and the parrot should be rewarded only when it does not screech (Low, 2001). Above all, the owner needs to understand that any sort of verbal or visual interaction with the bird (even the interactions that seem to be negative from the owner's point of view) is perceived as a positive reinforcement by the bird (Davis, 1991).

In order to prevent and to correct screaming, certain changes must be made, such as giving a better occupation and environmental enrichment to the bird; providing exciting food with different tastes, shapes and colours and giving a lot of freedom to the parrot (Low, 2001). Under certain circumstances, the acquisition of a partner for the parrot should be considered (Kaleta, 2003).

When dominance is part of the problem, many behavioural consultants suggest lowering the highest perch to mid-chest level (Davis, 1991). The very last method to apply is to cover the cage (Low, 2001). Even though this technique is not optimal and can even worsen the situation if not applied correctly, it is still often suggested to the owners.

4.2.3 FEATHER PICKING AND MUTILATION

Definition

Self-directed feather picking is the action of plucking or chewing feathers or down on any part of the body (apart from the head). This activity can lead to self-mutilation of the skin and the muscles that lie underneath the naked area.

The only form of feather picking which is taking into consideration and discussed in this chapter is the self-directed feather picking and mutilation.

Aetiology

Feather picking and mutilation are most commonly seen in cockatoos, African grey parrots and macaws. According to Wedel, feather picking has never been observed in the wild (Wedel, 1999). It seems to occur almost exclusively at night (Meehan *et al.*, 2003).

Feather picking very often begins at the time when the bird reaches its sexual maturity (Wedel, 1999). This behavioural problem seems to be linked with the human mental disorder "obsessive-compulsive disorder" (OCD). OCD is related to dysfunction in the brain areas responsible for the selection and sequencing of behaviour. It has been suggested that a similar neural disorder may underlie feather picking in parrots (Grindlinger and Ramsay, 1994). However, this statement must be considered with precaution, as feather picking (as stereotypic behaviour) probably has a similar mechanism to stereotypy in cases of human schizophrenia and autism (see text about stereotypies further down).

According to Lantermann, negligence in three main aspects of bird-keeping can cause feather picking: a) the size of the birds' cages; b) the parrots' high sensitivity, intelligence and extreme conservative behaviour (all especially well developed in grey parrots) and c) finally the birds' high social needs which are very often not taken into consideration when dealing with captive parrots (Lantermann, 1997).

Some causes which are known to contribute to the development of feather picking as well as factors that trigger feather picking are listed below:

- Stress: a move or even a change in the location of the cage in the same house, the owner's unavailability, the sudden presence of a new pet or a baby, the acquisition of a dominant or aggressive parrot (Low, 2001) or frightening situations in the dark without any withdrawal possibility (Gylstorff and Grimm, 1998).
- Chronic stress: a member of the family who keeps teasing and annoying the parrot, no withdrawal possibility within the cage or the cage placed too low, so that the bird cannot see what is going on in its surroundings (Low, 2001).
- Loneliness, boredom (Wedel, 1999), no occupation or toys in the cage (Low, 2001), improper cage size (Davis, 1991), social isolation.
- More than 12 hours of light a day (Wedel, 1999), low level of humidity (De Grahl, 1991).
- Misuse of the bird as a child's or as a partner's substitute for the owner or aversion for the owner. As soon as sexual maturity takes place, the bird usually reacts to this situation with aggressiveness, feather picking or screeching (Wedel, 1999).
- Imprinting on humans by hand-reared parrots that did not have the opportunity to learn species-specific behavioural patterns (Wedel, 1999).
- Sexual frustration and lack of an appropriate sexual partner. In disharmonious couples, the dominated parrot suffers from stress which can induce feather picking (Wedel, 1999).
- Nutritional deficiencies, such as: vitamin B, methionine, cystine or zinc, which cause a hindered growth of the feathers and can then generate feather picking (Gylstorff and Grimm, 1998). Besides, calcium, selenium, manganese, magnesium, biotin, pantothenic acid or salt deficiencies induce the growth of crumbly, brittle and crimped feathers and can therefore also occasion feather picking (Gylstorff and Grimm, 1998).
- Adiposis and an increased blood uric acid level (Gabrisch and Zwart, 2001). Besides, pain which can be caused by liver problems or skin diseases (Low, 2001).
- Too short wing-feather trims can traumatize the feather follicles. The resultant discomfort can lead to aggressive feather chewing and sometimes even mutilation. This is frequently seen in African grey parrots. They naturally do not have a very good sense of balance and can fall onto the floor and get injured in case of an incorrect feather trim (Davis, 1991).

There are often cyclical or seasonal changes in the extent of feather picking. Some parrots pick their feathers especially in the cold season, when the air is dry. Other parrots pick their feathers particularly during the mating season. On the other hand, some parrots pick their feathers only once during their whole lives and other birds do so continuously (Lantermann, 1997).

In her study, Jupprien observed feather picking especially often in parrots that had already had diseases triggered by general weakness. The parrots that had a well-balanced diet (germinated seeds and a lot of fresh fruit) and fresh branches picked their feathers significantly less than the birds that were fed on an inappropriate diet. Besides, most parrots that picked their feathers had already had several owners. The more owners the parrots had, the more likely they were to pick their feathers. On the other hand, regular bathing opportunities significantly reduced the problem. Finally, parrots that had man-made perches in their cages picked their feathers significantly more often than the individuals that had branches used as perches (Jupprien, 1996).

Preventing and correcting

To prevent feather picking, the parrots should be kept at least in couples in big aviaries and in an stimulating environment with toys and foraging opportunities. Besides, they should be provided with a well-balanced diet and weekly fresh branches or twigs in order to occupy the birds.

It is always advisable to perform a complete physical examination, including blood chemistries, Psittacine Beak and Feather Disease testing and faecal examination, and to take a complete nutritional history before behaviour modification is considered (Davis, 1991).

The owner should be careful not to reward this behaviour, for example by reacting or shouting when the parrot pulls out a feather. Because as a result, the parrot may carry on feather picking as attention-demanding behaviour, even though the original stimulus has been removed. The owner should ignore the bird and leave the room when the parrot plucks its feathers (Low, 2001).

If feather picking has lasted for some time and has become a habit for the bird, it is very difficult to stop it, even once the trigger has been removed. To cure feather picking, radical changes in the bird's environment and housing, more occupation with toys and foraging activities, the acquisition of a partner as well as climate readjustment should be tried (Kaleta, 2003). In a study, it has been shown that enriching the parrots' environment by providing appropriate foraging substrates (such as T-shirt bags and toy boxes, all filled with edible and inedible items) and increasing physical complexity (with plastic toys, ropes and ladders) can both significantly prevent and reduce feather picking among orange-winged amazons (Meehan *et al.*, 2003).

4.2.4 STEREOTYPIES AND ABNORMAL GESTURES (NERVOUS REPETITIVE HABITS)

Definition

Stereotypies are abnormal repetitive, unvarying, and functionless behavioural patterns that are often performed by captive and domesticated animals housed in barren environments (Garner *et al.*, 2003). Stereotypic behaviour goes through stages of development. In the early stages, the activity can easily be interrupted, whereas at later stages, such interruptions are impossible.

Stereotypies are absent in wild populations. They are commonly associated with self-injury in captive animals (Garner *et al.*, 2003). Begging and feather picking are also considered to be stereotypic behaviours by most authors (Lantermann, 1989). However, in this work, they have been discussed separately. In this chapter, exclusively repetitive locomotion stereotypies have been taken into consideration.

In this study, some parrots had abnormal gestures that could not be considered to be stereotypic, though they were repetitive and were executed always in a similar way. Those habits looked rather like displacement activities which were performed excessively frequently by the parrots and were usually carried out in specific situations, in which the birds obviously felt oppressed or nervous. Those

movements might have been a very early stage of development of stereotypic behaviour and may become stereotypic over a certain period of time.

Aetiology

Recent work on orange-winged amazons has brought the evidence that stereotypies in caged parrots have a common mechanism with stereotypies in schizophrenia and autism in human patients. The results suggest that, like in human patients, stereotypy in caged parrots reflects a general disinhibition of the behavioural control mechanisms of the dorsal basal ganglia. They also indicate that there is a potential psychological distress in animals having these behavioural disorders (Garner *et al.*, 2003). According to these results, stereotypies in captive animals are not equivalent to human Obsessive Compulsive Disorders (OCD) and should not be treated as such. However, they are often compared with OCD in human patients (Rapoport in Hellinger, 2000). The effect of selegilin-hydrochlorid (a selective MAO-B-blocker which is used in Parkinson's disease and schizophrenia) has been observed in a case of stereotypic feather picking in a pair of macaws. Yet, in this work, no positive change in the state of the birds' plumage could be noted over a period of 4 weeks (Hellinger, 2000).

Stereotypy is an abnormal coping-strategy of the animals that try, in spite of their deficient and inadequate environment, to establish a motivation balance (Stolba, 1983 in Hellinger, 2000). In restricted environments with little stimulus, young squirrel monkeys that are precociously weaned or isolated individuals have stereotypic behaviour when separated from their mothers at birth and nursery reared in individual cages (Philbin, 1998). This observation has also been made for macaques, rats, or even human beings that have been separated from their mothers at an early stage.

Cage size, housing type (individual, in couples or in groups), stress, lack of environmental complexity and boredom do not necessarily cause stereotypic behaviour in monkeys. However, in the animals which already exhibit this behaviour, these conditions will tend to accentuate it and to influence its frequency. There might be a genetic or prenatal basis for the threshold of anxiety in monkeys which could influence the incidence of stereotypic behaviour (Philbin, 1998).

Philbin suggests that intrinsic factors, such as rearing history, breed or genotype and also individual disposition determine whether or not an animal will develop stereotypic behaviour (Philbin, 1998).

Jupprien, though she had only 5 parrots that had that behaviour problem in her study, mentioned increased stereotypies in the following circumstances: in males, in birds whose relationships with the owners were especially close, in parrots that had had several owners, that were kept indoors and that had standard manufactured perches in their cages (Jupprien, 1996).

Preventing and correcting

Unfortunately, stereotypic movements are very difficult to cure or even to alter once they have been adopted by the parrots, even when drastically changing the birds' housing systems and environments. According to Kaleta, stereotypic behaviour in caged parrots is usually induced by hand-rearing and is therefore very difficult to reduce. He suggests providing much bigger aviaries, keeping the birds in groups and giving appropriate occupation to the parrots (Kaleta, 2003).

4.2.5 INFANTILE BEHAVIOUR

Definition

Begging for food of the owner is infantile behaviour which presumably does not occur in the wild in adult parrots and which is associated with stereotypies by some authors (Lantermann, 1989). However, we do not believe those movements to be stereotypic, as they are easily interruptible and as they are

usually purposeful and only displayed by the birds when something edible is held by the owners. The parrots get into a crouched position and move their whole bodies up and down, while their heads make circular movements. Usually, a typical guttural sound is uttered while begging.

Aetiology and correcting

Begging is often induced by imprinting on humans in hand-reared parrots and is therefore very difficult to correct (Kaleta, 2003). Hand-reared mature cockatoos tend to display such infantile behaviour more often than other parrot species (Wedel, 1999).

In order to correct this behaviour, the parrots should be housed in bigger aviaries. Besides, if possible, another person should take care of the birds (Gylstorff and Grimm, 1998).

4.2.6 SEXUAL BEHAVIOUR PROBLEMS

Definition and aetiology

Bond with human beings: in hand-reared parrots this is usually caused by imprinting on humans. However, it can also be caused by social isolation of parent-reared birds from conspecifics over a very long period of time during which the owner is accepted as a substitute for a sexual partner. The parrots display then all the sexual behavioural patterns for the owners, such as regurgitation, courtship and copulation.

Masturbation and regurgitation onto objects: this behaviour is the expression of the parrots' sexual frustration. It is displayed on perches or objects in the birds' surroundings in the case of parrots that are kept alone for a long time. This behaviour is not literally a behavioural disorder and can be interpreted rather as an extreme example of behavioural adaptation (Lantermann, 1989).

Hypersexuality: this is characterized by abnormally increased (hypertrophic) sexual activity.

Chronic egg-laying: this problem is very often encountered in tame females which are kept alone. The causes can be imprinting on human beings (because of hand-rearing), "intimate" physical contact with the owners (stroking the backs of females can induce egg-laying), a hormonal imbalance or the constant presence of nesting-boxes. To avoid weakening the organisms of the females, they should not be allowed to lay more than three clutches a year, with a following relaxation time of at least 6 months (Wedel, 1999).

Preventing and correcting

Bond with human beings, masturbation and regurgitation on objects: parrots should always be kept in couples or in groups. Chicks should never be hand-reared without any contact with other birds and should be kept with conspecifics in an aviary once they have reached their independence in order to prevent them from being imprinted on human beings.

Chronic egg-laying: the eggs must be left in the nest for approximately 4 weeks, then the eggs and the nesting-box should be removed. It is advisable for the owner to stop stroking the female. Medroxyprogesterone can be injected so as to interrupt the egg production for a few weeks to months (Wedel, 1999).

4.2.7 ABNORMAL ACTIVITY: FROM APATHY TO HYPERACTIVITY

Definitions

Apathy: this is general listlessness and a lack of reaction to stimuli in the animals' environments (Juppien, 1996).

Hyperactivity: this is generally described as disorganized, restless and disruptive behaviour which is characterized by constant and excessive movements.

Aetiology and correcting

Apathy: this can be caused by an extreme lack of stimuli in the parrots' environments (Kaleta, 2003). Juppien noticed a slight tendency to develop apathy among parrots that had manufactured standard perches at their disposal, no toys in their cages and only a few plants in their environments. Only 4 birds in her study were apathetic and the results were therefore difficult to interpret (Juppien, 1996).

As therapy to that behavioural problem, Kaleta suggests mounting a true-light bulb in the room in which the aviary is located. He also advises the owner to buy a partner for the bird and to increase the attractiveness of the parrot's environment (Kaleta, 2003).

Hyperactivity: its aetiology is not clear. An inappropriate diet can cause hyperactivity (sugar, caffeine, chocolate, too much in the way of vitamins and too high a proportion of hemp seeds in the diet). Unfortunately, absolutely no documentation about hyperactivity in parrots could be found. In cats, this behaviour can either have a genetic component or can be observed in kittens that have not been brought up by their mothers. However, the observations made on cats have been noted down as a matter of interest and cannot be directly applied to parrots without any study being undertaken in that field.

4.2.8 ANXIETY, PHOBIA

Definitions

Anxiety: this is an emotional response which is physiologically related to fear. Anxiety is a severe fear of a stimulus that the animal considers to be very dangerous in an environment in which the individual cannot escape from the danger.

Phobic behaviour: this is a fear subject to generalization which is out of proportion and out of context. It is a long-lasting fear (with a long recovery) which interferes with the animal's normal functions and which does not require the presence of the original trigger. Besides, a phobia is not graded and usually increases in old age (Heath, 2004). According to this definition, a phobia should be limited to some extreme cases of fear-related problems in parrots. Most of the abnormal fears encountered in parrots should therefore rather be interpreted as "anxiety". However, the word "phobia" is often mentioned in American literature about parrots. It describes a very strong fear of something specific (often of the owner) that appears suddenly (Low, 2001).

Aetiology

African grey parrots and cockatoos are known to be especially prone to developing phobic behaviour. The trigger that makes a parrot terrified is not always apparent. However, certain factors are known to cause phobic behaviour, such as too short wing and toe nail clips, chasing the bird when it falls to the floor or anything scary coming from above which could trigger the natural fear of predators (for

example installing a track-lighting on the room ceiling) (Wright, 2001). Moreover, earth tremors and any frightening experiences in the parrots' lives can also cause anxiety or even phobia.

As the results of a study at the University of California suggest, the development of neophobia (fear response to novel objects) in orange-winged amazon parrots does not seem to be related to parental care, but may be related to the level of novelty that the chicks experience during early life (Fox and Millam, 2004).

4.3 PATHOLOGICAL AETIOLOGIES OF BEHAVIOURAL DISORDERS

The following differential diagnosis must be taken into consideration for every behavioural problem (Heath, 2004):

- Normal inappropriate behaviour (learned or innate)
- Psychological problems for which there is no recognized medical cause
- Medical problem

Physical causes must always be excluded before considering behavioural causes. A precise medical history and a thorough clinical examination are therefore essential. In some cases, a neurological examination, blood tests, urine tests and radiography are necessary. Unfortunately, an exact diagnosis of central nervous disorders in live birds is rather difficult to make and the cause can often not be detected prior to necropsy (Wedel, 1999). Symptoms of central nervous disorders can include apathy, absences, fearfulness, irritability, convulsions, seizures, tremors, states of disequilibrium, rotation movements, torticollis, palsy und uncontrolled screaming (Wedel, 1999).

Below is a non-exhaustive list of medical problems which are commonly seen in parrots and which can lead to changes in their behaviour (Wedel, 1999):

- Cranial trauma: e.g. by flying into windows or by rushing into the bars of the cages because of sudden fright
- Encephalitis due to viruses: paramyxovirus, proventricular dilatation syndrome, adenovirus, herpesvirus, reovirus, papovavirus
- Encephalitis due to bacteria: salmonella, mycobacterium, klebsiella, listeriosis, psittacosis
- Encephalitis due to fungal conditions: aspergillosis, candida, mucor
- Encephalitis due to parasitic agents: toxoplasmosis, roundworms
- Metabolic diseases: hypocalcaemia, gout, hepatic encephalopathy
- Vitamin B and E deficiencies
- Cardiovascular diseases: cerebral arteriosclerosis, ischemic attacks
- Epileptic seizures
- Poisoning: lead, zinc, plants, salt, alcohol, nicotine
- Brain tumours

4.4 TRAINING "COMPANION PARROTS"

Such training is particularly widespread in the United States. There are many owners' guides available about how to train companion parrots. This concept is briefly discussed in this chapter, as behavioural consultants work on that basis in order to reduce or to cure behavioural disorders.

This technique consists of applying the following summarised principles.

The parrots should be very well socialised (with humans) just after weaning. They should be used to being confronted with different types of persons and environments during that period. Besides, every effort should be made to reinforce only positive behaviour. The baby must also learn how to occupy its time by playing with toys (Athan, 1999).

The "step-up" command is considered to be necessary for good social adjustment and is essential for future control of the parrot. Therefore, it should be trained on a daily basis in a neutral room which is located outside the parrot's territory. An effective authority-based relationship must be established so that the bird knows its place in the family social structure (called pecking order). In order to prevent the bird from developing dominance problems, step-up practice should be done daily, the parrot's wings should be trimmed and the perches should be placed lower than the owner's mid-breast level.

During the developmental period of the parrot, all efforts should be made to ensure that biting, fearfulness, territorial or attention-demanding behaviour are not reinforced. The techniques used to condition the birds are based on positive reinforcement, on the anticipation of undesired behaviour, redirecting behavioural patterns and providing self-rewarding distractions (Athan, 1999).

However, we do not encourage applying some of the aspects of this technique, as parrots are genetically wild animals and basically ought to be treated as such. Their natural needs have to be respected to allow them to develop normal behaviour in captivity. The method of conditioning and dominating wild birds in order to prevent them from displaying undesired behaviour in our totally unnatural environment and social structure should never be applied instead of ameliorating their welfare and housing.

5 HOUSING, CARE AND WELFARE OF GREY PARROTS IN CAPTIVITY

5.1 SOCIAL NEEDS

African grey parrots are extremely sociable. In the wild, they live in couples or in families within a flock which can be composed of hundreds of birds. The couple spends most of its time together. If the pair is briefly separated for one reason or another, both parrots keep in touch using contact calls.

Therefore, it is very important to keep those intelligent birds in couples or in groups. The parrots' extremely high social needs are an essential aspect to consider before acquiring African grey parrots. Despite that, grey parrots are still far too often kept alone. Unfortunately, this is often due to the owners' lack of information prior to the acquisition of the birds. Most owners do not get sufficiently informed about their parrots' needs. Besides, most "standard" cages which can be purchased in pet shops in Switzerland are designed to house one single animal.

After a few years, many owners realize that they cannot satisfy the birds' social needs and decide to buy partners for their birds. Even though it is still possible to re-socialize a parrot after years of being housed isolated from conspecifics, it becomes much more difficult, because the parrot has eventually adjusted and bonded with a human being, who the bird considers to be a substitutive partner. Besides, grey parrots are very selective in their relationships with other parrots and their characters must be compatible. It is thus easier to buy two birds from the start that get along with each other than to purchase at a later date an unknown parrot for the first bird, as they can very well not make a good match.

Nevertheless, the housing of one single parrot can, under certain circumstances, be acceptable as it may be very beneficial to the owner and can have a very important role to play in the owner's social life. This can be the case for people that do not work, persons that suffer from illnesses or that are somehow socially isolated.

5.2 FOOD

Grey parrots are probably food specialists in the wild. They seem to feed mainly on the flesh of oil-palm trees. It is therefore still not quite clear exactly how those parrots should be fed in captivity (Lantermann, 2000).

Guidelines about how to compose a well-balanced diet for grey parrots vary from source to source. A balanced nutriment should be constituted of 50% vegetables, 20% grains and beans, 10% fruit, 15% seeds or nuts and 5% greens (Wright, 2001). According to other authors, a balanced diet should consist of 45% seeds and nuts, 20% fruit and vegetables, 25% high-protein food and 10% grains and beans (Gabrisch and Zwart, 2001). However, most of the specialists agree that fruit and vegetables must be provided in sufficient quantities, that is to say that at least 50% of a well-balanced diet should consist of vegetables and fruit. African grey parrots are known to be very conservative towards their diets. This implies that new food items should constantly be proposed to the birds and that a lot of perseverance and patience is required from the owners.

Conventional commercial seed mixes for parrots usually contain sunflower seeds, rice, oats, safflower seeds, hemp seeds, wheat, peanuts, pumpkin seeds, stone pines, millet, corn, buckwheat and canary

grass in varying proportions. Besides, seed mixes can also contain flaxseeds, rye, thistle, or locust beans.

A great variety of fresh vegetables and fruit must be provided daily for the bird in a separate bowl. Besides, egg food and other protein sources, such as low-fat yogurt, cottage-cheese, brewer's yeast, shrimps or rotten trunks should be given to parrots, especially during their moults and the reproductive season (Schallenberg). Calc, grit and fresh water must always be at the birds' disposal. As an addition to the previously mentioned nutriments, soaked seeds, sprouts (germs not exceeding 1 cm) and bran are valuable complementary foods (Schallenberg).

A mash diet (food grated in a food processor) which is attractive to many grey parrots, as well as cooked pureed food which can contain potatoes or carrots, can also be provided for parrots (Wright, 2001).

Twigs and branches of maple tree, beech tree, alder, ash, elder, basswood, poplar, rowan tree, willow, whitethorn (Wolter, 1985), wild rose, larch and also pine and fir cones (De Grahl, 1991) are edible and can be given to the birds. Besides, many edible wild plants and herbs can be gathered in our fields and forests such as: sorbs, haws, elderberry, shepherd's purse, watercress, parsley, chickweed (Wolter, 1985), wild carrot, dandelion, plantain, Jerusalem artichoke, sea buckthorn, scarlet firethorn, nettle, horsetail and beech-nut (Schallenberg).

Commercial pellets which contain all the nutriments parrots are supposed to need are available on the market. Unfortunately, though the nutritive value of such food is very good, it does not provide enough occupation for the birds which often already suffer from boredom in captivity.

Avocado, caffeine, chocolate, rhubarb, carbonated beverages, pits, seeds of many fruits, alcoholic beverages, high-fat, fried and salty foods, high sugar foods, chemical preservatives and dyes, artificial colouring and flavouring have been proved to be either toxic or dangerous for the parrots' health and should therefore be avoided (Wright, 2001).

5.3 HOUSING

The best solution to house parrots is to build an aviary with, if possible, a heated outdoor element. There are different types of wire-mesh units available on the market for building aviaries. They can be individually assembled according to the configuration of the owners' houses. Branches with their bark on should be preferred to commercially manufactured perches and should be placed at different heights in the aviaries. Besides, boxes or hollow trunks can be mounted in cages in order to provide a shelter or a withdrawal possibility for the parrots. Parrots also need at least three bowls for food and water, "toys" and water basins. Another very good possibility of housing parrots is to convert rooms into bird-rooms.

A few cages for parrots are available in pet shops. Those "standard" cages measure either approximately 60x80x100 cm or 80x100x120 cm. Those housing systems are not optimal and cannot be recommended for the birds' welfare, as they do not allow the parrots to truly fly and are unfortunately meant to house one single parrot. They are big enough only if the parrot is free at least for a few hours every day. If this is not possible, the bird should be housed in an aviary of at least 100x100x200 cm, though a minimal size of 100x200x200 cm would be better.

5.4 ENVIRONMENTAL ENRICHMENT

Animals that are housed in barren environments show an overall decrease in interaction with their environments. The animals lie down, sleep more and spend significantly more time sitting. Besides, they overreact to novel and/or unexpected events with fearful and aggressive responses. Furthermore, the animals may develop stereotypies (Wemelsfelder, 1994). According to Wemelsfelder, the consequences on their behaviour of animals being housed in barren environments can be interpreted as boredom, depression and/or anxiety (Wemelsfelder, 1994).

In order to prevent the development of such abnormal behavioural patterns in captivity, there are several possibilities of enriching the parrots' environments. Housing the parrots in pairs, providing foraging opportunities, gnawing materials such as fresh branches, wooden toys or ropes, giving appropriate substrates or climbing devices to the birds as well as frequent changes in the birds' environments can successfully occupy parrots and reduce boredom.

In a study, the cages of red-fronted parakeets were enriched by food being spread over the aviary ground and crackers offered to the parrots, "bird-earth" as a substrate (containing compost, wood fibres, straw and grit), nibbling branches and wooden toys provided for the birds. Both the males and females that were housed in the enriched cages were much more active and spent less time resting than the birds belonging to the control group. That demonstrated that the enrichment given to the red-fronted parakeets had given them an appropriate occupation (Schumann, 1997).

Further, in a work about orange-winged amazons, the effect of enrichment (both foraging enrichment and enrichment so as to increase the physical complexity of the cages) on the fear and exploratory responses of the birds has been studied. The parrots in the enriched cages had significantly shorter latencies before approaching novel objects placed in their cages than subjects from the control group. In addition, parrots from the enriched environment spent less time interacting with novel objects. Besides, birds in the control group had significantly higher response scores to familiar than unfamiliar handlers, while in the enriched group, both scores (responses to familiar and unfamiliar handlers) were similar. Thus, environmental enrichment reduced fear responses to both novel objects and unfamiliar human handlers. The results suggest that investigation and interaction with the environment may be a behavioural need for young parrots (Meehan and Mench, 2002).

Finally, in a study about different parrot species, some evidence for contrafreeloading has been provided, as the parrots used the foraging device even though identical free food was available in their food bowls. These results imply that it is possible to enrich parrot cages relatively simply by increasing foraging opportunities for the birds (Coulton *et al.*, 1996).

All those results demonstrate that environmental enrichment is essential in parrots' welfare and is successful in reducing inactivity and boredom.

6 EXPERIENCE

6.1 TESTING PROCEDURES AND SUBJECTS

6.1.1 SUBJECTS CONSIDERED IN THE STUDY

The parrots needed to satisfy certain conditions in order to be admitted in the study:

- African grey parrots belonging to both subspecies (*Psittacus erithacus erithacus* and *Psittacus erithacus timneh*) were accepted. Only one species of psittacine birds was selected so as to avoid being confronted with different behavioural patterns (of phylogenetically remote parrot species) that would have considerably complicated the evaluation of the results. African grey parrots were chosen for their intelligence, their great sensitivity and their tendency to develop behavioural problems in captivity. Besides, they are very commonly kept as pets compared to other big parrot species.
- These African grey parrots had to be at least 3 years old. An age limit was set in order to select the birds that had a fully formed character and the behaviour of an adult bird, even though it was clear that all the sexual behavioural patterns may not be present or fully developed at that age, as sexual maturity usually takes place between the third and the fifth year of life (Lantermann, 2000).
- Their origins had to be known from the owners or recountable through previous owners or breeders. For the hand-reared parrots, it was essential to find out who the breeders had been.
- The birds had to be kept as pets. Parrots that were exclusively used for breeding purposes were not accepted, though the ones that were kept in couples, in a group or with birds from other species were admitted. The reasons for that selection were firstly because the questionnaire had been made with many questions concerning the relationship with the owner and secondly because many important points of the questionnaire were about observation of the bird's behaviour, which is much more achievable when the owner has got quite an intensive daily contact with the bird.

The study involves 105 grey parrots belonging to 94 owners. Those parrots were first divided into the following main groups:

a) 64 parrots had been hand-reared, b) 13 birds had been raised by their parents and c) 26 parrots had been caught in the wild. In addition, 2 parrots came from breeders that could not be contacted. It was therefore impossible to confirm that those birds had been hand-reared or naturally bred (by their parents) and they could not be used in the statistical analysis.

6.1.2 TESTING PROCEDURES, VISITING THE OWNERS

The 94 grey parrots' owners were found thus: 20 owners were acquaintances, 63 were contacted through an avian vet, 6 through aviculturists, 3 through a bird keepers' club and 2 through an advert put up at the universities of Berne and Zurich. The owners that were found thanks to the vet were sent a letter explaining the study, and a card which had to be sent back if the owner agreed to participate. 61% of the bird keepers contacted in this way accepted to take part in the study.

All the owners were visited by the same person, so that the questions would always be asked in the same way. The visits lasted for about two hours and usually took place at ten in the morning or at two in the afternoon (in a few cases in the evening). Most of the time, the parrots could be observed during the whole interview. When that was not possible (e.g. if the parrot was kept in an outdoor aviary), at least ten minutes were taken at the end of the visit to watch the bird and try to come into contact with it.

6.1.3 ENQUIRY ABOUT THE ORIGINS OF THE BIRDS

The breeders of all hand-reared birds (and in some cases of parent-bred parrots) were phoned after the interview with the owner. The owner was first asked for details about the rearing method and the origin of the bird, and these were then checked with the aviculturist. Owners that partially hand-reared their parrots themselves usually knew how the chicks were kept at the breeders' and at what stage of their development they had been removed from their nests. Owners that had bought the parrots once fully weaned had generally not been informed about the way their parrots had been reared. For some birds, pet shops had to be contacted to try and find out information about the origin of the birds. In two cases, the breeders could not be identified, in spite of thorough investigations. The only certainty is that those two parrots had been bred in captivity.

6.2 QUESTIONNAIRE

A questionnaire containing mostly closed questions (on the one hand for the owner and for the aviculturist and on the other hand for our own observations) was used. Some rather subjective criteria (e.g. "stimulation") that were used in the statistical analysis were not included in the questionnaire, but evaluated and objectified using a key combining several factors from the questionnaire. Those criteria are explained and characterized further down (see chapter 6.3).

Below is an overview of the questions contained in the questionnaire (originally in French and German) with the possible answers to the multiple-choice questions (one or several answers could be chosen depending on the question):

Questionnaire

1. Address and phone number of the owner

2. Parrot's curriculum vitae

2.01. Identification	
Name, identification number	▪ ...
Type of identification, ring-number	▪ quarantine ring, breeder's ring, microchip, others
Sex	▪ female ▪ male ▪ unknown
Sexing method	▪ DNA ▪ endoscopy ▪ appearance of the bird ▪ the parrot has laid eggs
Date of birth ¹⁾	▪ ...
Date of acquisition ²⁾	▪ ...
2.02. Origin	
Origin/breeding	▪ Swiss bred ▪ bred and imported ▪ captured as an adult and imported ▪ wild-caught (age unknown) ▪ captured in the nest and imported
Acquisition	▪ bought at the breeder's ▪ bought at a pet shop ▪ bought from a previous owner
Number of previous owners	▪ 0 ▪ 1 ▪ 2-5 ▪ unknown

Housing at the previous owner's ³⁾	(according to the current owner) ▪ unknown ▪ enough freedom or space (yes/no) ▪ owner most of the time at home (yes/no) ▪ behaviour towards the bird (good/inappropriate) ▪ care and hygiene (good/bad)
With grey parrot(s) at previous owner's	▪ yes ▪ no ▪ unknown
With other parrot(s) at previous owner's	▪ yes (which species?) ▪ no ▪ unknown
Reproduction	▪ has had offspring ▪ no offspring ▪ unknown
Reason for the donation of the parrot	▪ ...
Change of housing	▪ progressive ▪ radical change
2.03. Breeding method (questions for the breeder)	
Breeding method	▪ wild-caught ▪ parent-bred ▪ hand-reared
Contact with parrots during hand-rearing ⁴⁾	▪ no contact with the clutch ▪ with other chicks
Age when removed from the nest ⁵⁾	▪ 0-2 ▪ 4 ▪ 6 ▪ at least 8 weeks
Contact with human beings during rearing	▪ minimal contact ▪ intensive contact with the breeder ▪ intensive contact with the owner
Feeding method	▪ spoon ▪ pipette ▪ syringe ▪ tube
Diet during hand-rearing	▪ commercial hand-rearing food ▪ commercial hand-rearing food with complements ▪ home-made mixture (+ ingredients)
Weaning	▪ bought before weaning ▪ bought once fully independent
Age of weaning	▪ ...
Problems during the weaning period	▪ ...
Diet during weaning	▪ ...
Social contact with parrots during weaning	▪ no contact ▪ with other parrots ▪ visual contact with other birds

3. Social contact in the bird's environment

Social contact with other pets	▪ no other pet ▪ next to parrot(s) ▪ next to bird(s) ▪ with parrot(s) ▪ with bird(s) ▪ dog(s) ▪ cat(s) ▪ rodent(s) ▪ other
Is / was it kept with grey parrots? If so, since when?	▪ yes, since... ▪ no
Contact with grey parrots (belonging to somebody else)	▪ yes (+ frequency) ▪ no
Contact with pets in the past	▪ no contact ▪ other bird(s) ▪ other parrot(s) ▪ dog(s) ▪ cat(s) ▪ rodent(s)
Owner's presence	▪ has moved out and been replaced ▪ less than 2 hrs a day ▪ about 2 hrs a day ▪ 2-4 hrs a day ▪ afternoons or mornings ▪ all day long
Sex of the owner	▪ female ▪ male
The owner is considered as a partner by the bird ^{6) 7)}	▪ yes ▪ no
Presence of relatives at home	▪ the owner is alone ▪ 2 hrs a day ▪ 2-4 hrs a day ▪ afternoons or mornings ▪ all day long
Relationship of the parrot with every member of the family ⁸⁾	
Current availability for the bird	▪ less than one hr a day ▪ one hr a day ▪ 2-3 hrs a day ▪ more than 3 hrs a day
Contact with the bird for care only	▪ yes ▪ no
Type of relationship with the owner (own observation)	▪ very intense (close relationship, which is kept up by the owner) ▪ intensive ▪ neutral (passive relationship with the parrot)
Behaviour towards the bird (own observation)	▪ impatient ▪ nervous ▪ irritable ▪ too noisy ▪ jerky or abrupt gestures

4. Acquisition

Reasons for the acquisition of the bird	▪ need for a companion ▪ fascination for the character or behaviour of grey parrots ▪ to own an "animal that speaks" ▪ gift ▪ beauty of that species ▪ the owner knows somebody who owns one ▪ other reason
Bird's behaviour at the time of purchase	▪ tame ▪ at ease ▪ friendly ▪ curious/playful ▪ shy/scared ▪ aggressive ▪ indifferent ▪ other

5. Training

Trained	▪ yes (what for?) ▪ no
Taming method	▪ talking calmly to the bird ▪ giving it treats in the cage ▪ giving it treats outside its cage ▪ taking it on the hand inside the cage ▪ taking it on the hand outside the cage ▪ touching it inside the cage ▪ touching it outside the cage ▪ restraining the parrot
No respect of the bird's individual distance	▪ yes ▪ no
Owner's reaction to an unwanted behaviour	⁹⁾ ▪ shouting at the bird ▪ physically punishing it ▪ saying "no" ▪ distracting it with gestures ▪ distracting it with noises ▪ putting it back into its cage ▪ covering the cage ▪ leaving the room ▪ ignoring the parrot ▪ other
Docility towards strangers ¹⁰⁾	▪ aggressive ▪ bites whenever anybody approaches it ▪ warns especially with visual signals ▪ fears humans/shy ▪ not tame ▪ friendly ▪ at ease with humans ▪ climbs onto hands or shoulders ▪ lets strangers scratch its nape ▪ tries to draw anybody's attention ▪ bows its head in order to get scratched ▪ lies on its back to play ▪ lets be stroked/touched all over its body
Docility towards the owner ¹¹⁾	▪ aggressive ▪ bites whenever the owner approaches it ▪ warns especially with visual signals ▪ fears the owner/shy ▪ not tame ▪ friendly ▪ at ease with the owner ▪ climbs onto hands or shoulders ▪ lets the owner scratch its nape ▪ tries to draw the owner's attention ▪ bows its head in order to get scratched ▪ lies on its back to play ▪ lets itself be stroked/touched all over its body

6. Behaviour

6.01. Aggressiveness

Type of aggressiveness	▪ aggr. towards objects (which ones) ▪ aggr. towards the "partner" ▪ aggr. towards one member of the family in particular ▪ aggr. towards/preference for one sex ▪ aggr. towards parrots ▪ aggr. towards pets (which ones?) ▪ aggr. towards everybody ▪ aggr. towards everyone except the owner ▪ flying attacks
Aggressiveness ¹²⁾	▪ not particularly aggressive ▪ aggressive ▪ very aggressive
Aggressiveness towards the owner	▪ never pecks him/her till it bleeds ▪ sometimes bites him/her
Reasons why the parrot bites	▪ fear ▪ jealousy ▪ dominance ▪ warning ▪ while playing ▪ to defend its territory ▪ no reasons.
Description	▪ ...

6.02. Screeches / screams

Is the parrot abnormally noisy?	▪ yes ▪ no
Does the bird make mechanical noises?	▪ yes ▪ no
Frequency of the problem	▪ ...

6.03. Feather picking

Maximal stage ever reached	▪ 1: no feather picking ▪ 2: some feathers missing or gnawed ▪ 3: breast, shoulder, back or tail periodically picked ▪ 4: whole body periodically picked ▪ 5: feather picking and self-mutilation
Does feather picking still occur?	▪ yes ▪ periodically or sporadically ▪ no
When did the problem start?	▪ ...
How does the bird proceed?	▪ chews its feathers ▪ plucks them ▪ both chews and plucks them
Any cyclical changes?	▪ yes (when?) ▪ no
Feather picking stage (at time of visit)	▪ 1 ▪ 2 ▪ 3 ▪ 4 ▪ 5
Original cause of feather picking	▪ social/sexual frustration ▪ stress/trauma ▪ inappropriate care ▪ imitation of other parrots ▪ health problems ▪ trigger unknown
The owner reinforces the behaviour	▪ yes ▪ no ▪ unknown

6.04. Repetitive movements observed by the owner

Repetitive movements present?	▪ yes ▪ no
Frequency	▪ ...
Trigger	▪ ...
Description	▪ ...
Duration	▪ ...
When did it start?	▪ ...

6.05. Anxiety ¹³⁾	
Has the bird developed a specific fear?	▪ yes ▪ no
Fearful towards what/who?	▪ one particular person ▪ the owner ▪ a specific object ▪ a situation ▪ pets/animals
Description of the behaviour	▪ ...
6.06. Infantile behaviour	
Does the parrot beg for food?	▪ yes ▪ no ▪ unknown
If so, does it get something to eat?	▪ yes ▪ no
Mouth-to-beak feeding?	▪ yes ▪ no
6.07. Sexual behaviour ¹⁴⁾	
Does the bird regurgitate food?	▪ yes ▪ no
Who does it want to allofeed?	▪ the owner ▪ owner plus other persons ▪ another parrot ▪ an object/mirror in the cage ▪ object plus people
Copulation attempts with the owner	▪ yes ▪ yes and masturbation ▪ only masturbation ▪ no
Does the parrot court the owner?	▪ yes ▪ no ▪ unknown
Laying	▪ never ▪ sporadically ▪ frequent ▪ chronic
Does the owner stroke the female?	▪ yes (can induce egg laying) ▪ no
Cyclical aggressiveness	▪ yes ▪ no
What season or what frequency?	▪ ...
Length of the cyclical changes	▪ ...
6.08. Mimicry ability ¹⁷⁾	
Does the parrot imitate?	▪ yes ▪ no
What does it imitate?	▪ noises ▪ intonation of the human voice ▪ words ▪ whole sentences ▪ words or sentences in relation with the situation
Example of words, sounds	▪ ...
When did the bird start imitating?	▪ ...
Did the owner teach it to talk on purpose?	▪ yes ▪ no
6.09. Problems for the owner	
Description of the problem(s)	▪ ...
When did the problem(s) start?	▪ ...
What did you do about it/them?	▪ nothing ▪ vet ▪ breeder ▪ behavioural consultant ▪ books or internet ▪ acquisition of another parrot ▪ change in its housing ▪ change in the diet ▪ training ▪ other

7. Care and housing

7.01. Housing	
Housing	▪ cage ▪ outdoor aviary (during the whole year, only in the warm season, only during the day) ▪ indoor aviary ▪ free in the flat ▪ bird room ▪ portable perch/tree ▪ chained onto a perch ▪ combination of different forms of housing
Recent changes in the bird's housing	▪ yes ▪ no
Size of the cage	▪ 40x40x60 cm ▪ 60x80x100 cm ▪ 80x100x120 cm
Size of the aviary	▪ 100x100x200 cm ▪ 100x200x200 cm ▪ bigger
Shape of the cage	▪ rectangular ▪ rectangular with rounded corners ▪ round
Wire mesh of the cage	▪ matt silver ▪ matt gold ▪ shiny silver ▪ matt silver ▪ other
Space betw. the horizontal bars of the cage	▪ ...
Location of the cage in the room	▪ in a corner ▪ adjacent to a wall ▪ next to a window ▪ can be reached from all sides
Highest perch in the bird's environment	▪ above eye level ▪ below eye level
Recent changes in the location of the cage	▪ yes ▪ no
Do you cover the parrot's cage for the night?	▪ yes ▪ no
Number of perches in the cage	▪ 1 ▪ 2 ▪ 3 ▪ more than 3
Material used for the perches	▪ man-made perches ▪ branch with its bark on ▪ synthetic ▪ concrete
Perches of different diameters	▪ yes ▪ no
Perches available outside the cage	▪ yes ▪ no

Mirror	▪ yes ▪ no
Bath	▪ yes, always at the bird's disposal ▪ yes, only available in the warm season ▪ no
Spray	▪ yes ▪ rarely ▪ no
Toys in the cage ¹⁵⁾	▪ many toys ▪ one toy or toys not used ▪ no toys
Toys outside the cage ¹⁵⁾	▪ many toys ▪ one toy or toys not used ▪ no toys
Do you leave the radio/TV on for the bird?	▪ yes, the TV ▪ yes, the radio ▪ no
Changes in the cage	▪ never ▪ once a year ▪ once a month ▪ more frequently
Room, in which the cage is located	▪ lounge ▪ dining-room ▪ kitchen ▪ balcony ▪ bedroom ▪ hall ▪ other
The parrot spends most of its time in the...	▪ lounge ▪ dining-room ▪ kitchen ▪ balcony ▪ bedroom ▪ hall ▪ other
Flight ability	▪ can fly ▪ cannot (why not?)
Have the feathers already been clipped?	▪ yes, they still are ▪ yes, but the parrot has moulted since then ▪ no
Who trimmed the wing-feathers?	▪ vet ▪ owner ▪ breeder ▪ other members of the family ▪ acquaintance ▪ other
When did you clip its wings for the first time?	▪ ...
How old was the parrot at that time?	▪ ...
Have they been clipped on both sides?	▪ yes ▪ no ▪ unknown
7.02. Care	
Hygiene	▪ excellent ▪ good ▪ acceptable ▪ bad
Litter	▪ no litter ▪ newspaper ▪ sand ▪ wood shavings ▪ other
How often do you clean the bird's cage?	▪ daily ▪ twice a week ▪ once a week ▪ 2-3 times a month ▪ more seldom
Grit or sand	▪ some ▪ none
Brightness in the cage	▪ very bright ▪ bright ▪ rather dark ▪ dark
Exposure to the sun	▪ yes, no possibility to go into the shade ▪ yes, withdrawal possible ▪ no
Artificial light	▪ normal bulb ▪ neon light ▪ halogen lamp ▪ true-light bulb ▪ whole spectrum light
Length of daylight	▪ very variable ▪ depends on the season or on the owner's activity ▪ less than 9 hrs a day ▪ 9-11 hrs a day ▪ 12-14 hrs a day ▪ at least 15 hrs a day
Temperature	▪ variable (outdoor aviary, with/without a heater) ▪ less than 10°C ▪ 10-15°C ▪ 17-21 °C ▪ more than 22°C
Humidity	▪ low (no humidifier, 30-40%) ▪ high (with humidifier, 45-60%) ▪ very high (more than 60%)
The owner smokes	▪ yes ▪ very rarely/only guests ▪ no
Colour of the walls	▪ white ▪ pastel or light shade ▪ bright colour ▪ no walls (outdoor aviary)
Particular colour in the bird's surroundings	▪ ...
How often is the parrot let out of its cage? ¹⁶⁾	▪ all the time ▪ many times a day ▪ every day ▪ 2-3 times a week ▪ once a week ▪ 2-3 times a month ▪ once a month ▪ more seldom ▪ never
Length of time	▪ all day long ▪ mornings or afternoons ▪ 1-2 hrs a day ▪ half an hour at the most
Free outside ¹⁶⁾	▪ yes ▪ never ▪ before
How often is the bird free outside?	▪ every day in nice weather ▪ 2-3 times a week ▪ once a week ▪ 2-3 times a month ▪ once a month ▪ more seldom (+ length of time)
Is the parrot's cage moved outside? ¹⁶⁾	▪ yes, every day when the weather is nice ▪ yes, sometimes ▪ never
The owner takes the parrot on holidays ¹⁶⁾	▪ yes, how often? ▪ no ▪ no, he/she never goes on holiday
Where does he/she take the parrot?	▪ to a pet shop ▪ to a breeder ▪ to a home ▪ to a friend ▪ the parrot stays at home
Do you take your bird on outings with you? ¹⁶⁾	▪ yes ▪ sometimes (frequency) ▪ never
Has the parrot already been to a show?	▪ yes, how often? ▪ no
Location of the food in the cage	▪ at the bottom ▪ halfway up ▪ at the top of the cage
Description of the bird's diet	▪ ...

Quality of the bird's diet ¹⁸⁾	▪ very well-balanced diet ▪ more or less balanced ▪ totally inappropriate
Variation of the diet	▪ yes (what? how often?) ▪ no
Does it get part of the owner's meals?	▪ yes (what? how often?) ▪ never ▪ not any more
New branches or twigs in the cage ¹⁵⁾	▪ at least three times a week ▪ once a week ▪ once a month ▪ twice a year ▪ always at the bird's disposal ▪ changed when the bark is totally peeled off ▪ never

8. Clinical examination, parrot's history

8.01. History	
Does the bird get any medicine?	▪ ...
How much does it drink/eat?	▪ ...
Has it already been ill? What illness (es)?	▪ ...
Has it already undergone an operation? Which one?	▪ ...
Has it already had medical treatment?	▪ ...
Is the bird especially clumsy?	▪ ...
Does it fall from its perch? How often? In what circumstances?	▪ ...
8.02. State of health	
Bird's reaction to its environment	▪ ...
Activity	▪ ...
Position/stance of the parrot on the perch	▪ ...
Breathing, nostrils (discharge?)	▪ ...
Wings held properly?	▪ ...
Flight ability	▪ ...
Bill quality and growth	▪ ...
Eyes (discharge?)	▪ ...
Weight, estimation of the parrot's corpulence	▪ ...
Limbs, feet, claws, skin	▪ ...
Droppings: consistency, colour, quantity	▪ ...
Urine: colour, quantity	▪ ...
Quality of plumage	▪ good ▪ bad/broken feathers ▪ over- or underpreened ▪ moult ▪ change of colour (place, since when, colour, description) ▪ feather picking

9. Observation of the bird during the interview

9.01. Attitude of the bird towards the interviewer ⁸⁾	
"Indifferent"	▪ yes (how long? description) ▪ no
"Aggressive"	▪ yes (how long? trigger, only visible signs or attacks, description) ▪ no
"Frightened"	▪ yes (when? how long? trigger, description) ▪ no
"Tries to draw attention"	▪ yes (how long? how?) ▪ no
Screeching / noisy	▪ yes (how long? when? how?) ▪ no
"Curious"	▪ yes (how long? description, about what/whom?) ▪ no
"Feels at ease" (comfort behaviour)	▪ yes (when? description) ▪ no
"Friendly / playful"	▪ yes (when? description) ▪ no
Repetitive movements	▪ yes (description, when? how long? frequency, description of the movements, trigger) ▪ no
Feather picking	▪ yes (when? how many times? chewing/plucking? what part of the plumage? trigger) ▪ no
Allofeeding	▪ yes (when? how many times? who? does the bird look healthy?) ▪ no
Others	▪ ...
9.02. Description of the parrot's behaviour	

10. Comments

6.3 DATA EVALUATION KEY

Some raw data of the questionnaire could not be used as such and had to be divided in the first place into categories or needed to be classified according to other factors.

The chapters 9 and 10 of the questionnaire contain observations of the bird, the owner and their relationship. As those statements were rather subjective, they merely helped us get an overview of the situation and were not used in the statistical analysis.

¹⁾ Age of the parrot: 3, 4-7, 7-15, 15-35, > 35 years old.

²⁾ Age at the time of purchase: < 3 months, 3-6 months, 6-12 months, 1-4 years, 4-10 years, >10 years.

³⁾ Evaluation of previous owners:

- *Excellent*: with another grey parrot, kept in an aviary with appropriate care and diet.
- *Average*: enough freedom or space, average care and diet and usually kept alone or with birds of another species.
- *Bad*: owner's inappropriate behaviour or care, owner often absent and insufficient space or freedom.
- *Unknown* or variable (when several previous owners acting differently).

⁴⁾ Contact with parrots during the hand-rearing period:

Chicks alone respectively with other parrots during most of the hand-rearing period (calculated as from the removal from the nest to the 13th week of life).

⁵⁾ Age when removed from the nest:

- *0-2 weeks*: 0 weeks means that the egg was artificially incubated. This group also includes the parrots that stayed 2-3 weeks with their parents and one bird that stayed 3 weeks in the nest.
- *4 weeks*: includes the parrots that stayed 3-4 weeks and 4-5 weeks with their parents as well.
- *6 weeks*: also includes the birds that were kept 5-7 weeks in the nest and one bird that stayed approximately 4-6 weeks in the nest but was already partially feathered when removed from it.
- *8 weeks*: including the parrots that were kept with their parents 7 weeks, 8-10 and 10 weeks.

⁶⁾ Chosen Partner:

- *Human being*: one person in particular or several persons.
- *Grey parrot*: obvious bond with one grey parrot.
- *Human being/grey parrot*: ambiguous relationship with a grey parrot and a human being, sexual displays with both species.
- *No partner*: no particular bond (or imminent change of bond)

⁷⁾ Number of partners:

- 1: also includes the hand-reared birds that chose a parrot as main bond directly after being weaned (by man) and the parrots that changed bond at puberty (for another human being), considering the first person as foster-parent.
- 2: if the hand-reared birds had been attached to one person over a long period (usually several years) and then changed their bond with a grey parrot.

⁸⁾ Selective behaviour towards human beings:

That criterion takes into consideration the bird's reaction to the approach of certain persons and to their attempts to hold it or to scratch its neck. No attention was paid to the selective behaviour towards one particular sex. This factor has been divided into four categories, considering the persons the parrot allows to approach and touch it.

- 1: members of the family and strangers
- 2: members of the family with little or no preference for one person
- 3: members of the family with a clear preference for the owner
- 4: only the owner

⁹⁾ Owner's reaction to the bird's undesirable behaviour:

As the owner could choose several answers at the same time, the worst or the most frequent reaction prevailed over the other answers.

- *Inappropriate reaction:* physically punishing the parrot, spraying it with a water pistol.
- *Average:* shouting at the parrot, covering the cage, saying "no".
- *Appropriate reaction:* ignoring the bird, leaving the room, distracting it, putting it back in its cage, explaining to it. The reactions "no" and "leaving the room" or "no" and "putting the parrot in its cage" were considered to be appropriate.

¹⁰⁾ Docility towards strangers:

- 1: shy (possibly aggressive), impossible to touch the bird.
- 2: ignores the presence of strangers, does not allow any physical contact with unknown persons.
- 3: comes onto the hand or the shoulder of strangers and/or allows them to scratch its neck.
- 4: tries to draw attention or bows its head in order to get scratched, allows strangers to touch it.

¹¹⁾ Docility towards the owner:

- 1: does not let the owner scratch its neck or take it on his/her hand.
- 2: in spite of its tameness, the parrot either does not come onto the owner's hand or does not let him/her scratch its neck (possibly because the parrot is never let out of its cage).
- 3: comes easily onto the owner's hand or allows him/her to scratch its head.
- 4: extremely at ease with the owner. The owner can turn the parrot over onto its back, stroke it all over or take it into his/her hand.

¹²⁾ Aggressiveness:

- *Not particularly aggressive:* does not attack on its own, bites if provoked or if anybody teases it.
- *Aggressive:* bites frequently or often pecks the finger holding a titbit rather than the treat itself or attacks by flying at one particular person.
- *Very aggressive:* flying attacks or impossibility to touch the bird at all without being attacked.

¹³⁾ Anxiety:

Frightened responses of the parrots towards big or new objects in their environment, towards birds of prey, gloves, nets, cloths or earth tremors were considered as being normal. Only a few parrots that had developed an uncontrollable fear of earth tremors or birds of prey were included in the group of the birds that had developed anxiety.

¹⁴⁾ Sexually active with another parrot:

The birds that only allopreened were put in the category "no". When the interactions were not obvious or hard to witness, the parrots were catalogued in the "not clear" group.

¹⁵⁾ Occupation:

- *Good:* branches or twigs given more than twice a year and many toys inside and outside the cage.
- *Average:* either many toys or branches frequently put into the cage.
- *Bad:* only one toy or no toys at all and seldom (twice a year) / never new branches.

¹⁶⁾ Stimulation:

- *Excellent:* cage moved outside every day/two different cages (for example an indoor aviary for the night plus an outdoor aviary when the weather is good) or the bird is frequently free out of doors/accompanies the owner for outings.
- *Medium:* 2 criteria among the following ones: outdoor aviary, two different aviaries, bird taken on holidays with the owner, cage sometimes moved outside, enough freedom (sufficient alone if the bird is always free).
- *Insufficient:* cage never moved onto the balcony; bird never free (inside or outside).

¹⁷⁾ Mimicry ability:

- *1:* does not imitate at all
- *2:* imitates noises or very few words
- *3:* imitates many words
- *4:* imitates noises, words and whole sentences

¹⁸⁾ Diet:

- *Very well-balanced:* separate bowl for fruit (varied varieties, e.g. not only apples) and vegetables **and** appropriate seed mixture **and** enough protein supply.
- *More or less balanced:* separate bowl for fruit (or daily supply in sufficient quantity) **and** no/very seldom human food or leftovers.

- *Totally inappropriate*: hardly any fruit at all/only few different sorts/no separate bowl for fruit **or** leftovers/food for human consumption **or** little fruit, inappropriate seed mixture and no protein supply.

6.4 STATISTICAL ANALYSIS

The raw data of the questionnaire were gathered, reviewed and adjusted using a database created on Access 2002. The data were then exported to NCSS 2001, where they were analysed using Chi-square statistics or two-tailed Fisher's Exact Test (when the expected value, that is to say the number of birds, in at least one row was smaller than 5). Besides, logistic regression was used to decipher the effects of certain factors and to distinguish the influences of confounders from those of other important criteria.

The influence was considered to be significant when the probability level was lower than 0.05 ($p < 0.05$) (Hüsler and Zimmermann, 1996). In chapter 7, every time a probability level was calculated using the Fisher's Exact Test, "FT" was noted next to the result. When nothing particular was mentioned, the Chi-square test had been used.

7 Results and discussion

7.1 DATA FROM THE QUESTIONNAIRE, DISTRIBUTION

7.1.1 BREEDING METHODS AND ORIGINS OF THE SUBJECTS

The distribution of the most relevant data, which have been obtained from the questionnaire, is first merely brought forward, before being examined and interpreted in the following chapters (as from chapter 7.2).

The most important condition for the parrots to be accepted in the study was that their breeding methods and origins had to be known with certainty.

Breeding method: 64 parrots were hand-reared, 13 were raised by their parents and 26 were caught in the wild and imported. The exact origins of 2 birds could unfortunately not be found out. Among the wild-caught group, 10 were bought when they were immature (they still had brown irises) and 4 were bought as adult birds. The ages of 12 of them were not known at the time of purchase. Among the hand-reared and parent-bred birds, 61 were raised in Switzerland at aviculturists', 4 were bred at the owners' homes, 8 came from amateur breeders and 5 parrots were bred in foreign countries and then imported to Switzerland. 31 breeders of hand-reared birds were contacted to enquire about the hand-rearing method used. Some of them had brought up several parrots that participated in the study. One breeder reared 6 of them, 2 breeders reared 4 birds each, 3 other breeders raised 3 birds each and 5 breeders brought up two parrots each. 11 of the 13 parent-bred parrots were sold once fully weaned. 1 bird needed complementary feeding with a spoon once a day and the situation was not known in one case.

Identification of the birds: 34 parrots were ringed at the breeders', 12 had a quarantine ring on and one bird had a microchip. That means that less than half of the birds were marked somehow and could be unequivocally identified.

Hand-rearing: the distribution of the hand-reared parrots for the hand-rearing factors considered in the study (such as social contact with parrots and people during the rearing period, the age at which the chicks were removed from the nest, the feeding method used, social contact during the weaning stage) is not repeated here as it has already been fully described in the corresponding chapters (7-3 to 7-8).

There were several sorts of diets used to rear the chicks. 33 birds were exclusively fed on a traditional hand-rearing diet, 13 were fed on a hand-rearing diet with complements, such as fruit or egg food for example and 15 parrots were given a home-made mixture containing among other things pureed baby food, egg food and mashed seeds.

Weaning: the age at which the chicks reached their independence was very varied. 5 birds, according to the breeders, were fully weaned at 10 weeks, 11 birds at 12 weeks, 8 parrots at 13-14 weeks, one chick was fully weaned at 16 and one at 18 weeks. The slowest chick to become fully independent was 20 weeks old at that time. 12 breeders or owners did not know the age at which their parrots had become independent, though they usually knew if they had been weaned earlier or later than most other grey parrots and if any problems had occurred during that period. In short, 8 parrots were independent earlier than most grey parrots, 25 were weaned at the normal age, 2 birds had a rather problematic weaning-period and 5 took a longer time before being fully weaned compared with most African grey parrots. The weaning process was unknown for 25 hand-raised parrots.

7.1.2 SEX, AGE AND HEALTH OF THE SUBJECTS

Sex: both sexes are almost equally represented with 34 females and 36 males. The sex of 35 parrots is unknown. Their gender was determined using the following methods: 30 birds underwent an endoscopy, a DNA-analysis was done for 25 parrots and 5 females had laid eggs. 10 parrots were classified according to their appearance and behaviour, which is a very unsure method. Nevertheless, as 5 of those birds are supposedly males and 5 supposedly females, it is not consequential if one of them has been catalogued in the wrong group.

Age: the ages of the birds were very heterogeneous and ranged at the time of the visit to the owners' homes from 3 to 73 years (fig. 7-1). 7 birds were 3 years old, 34 were between 4 and 7 years old, 33 between 8 and 15, 21 between 15 and 35, and 8 grey parrots were over 35 years old.

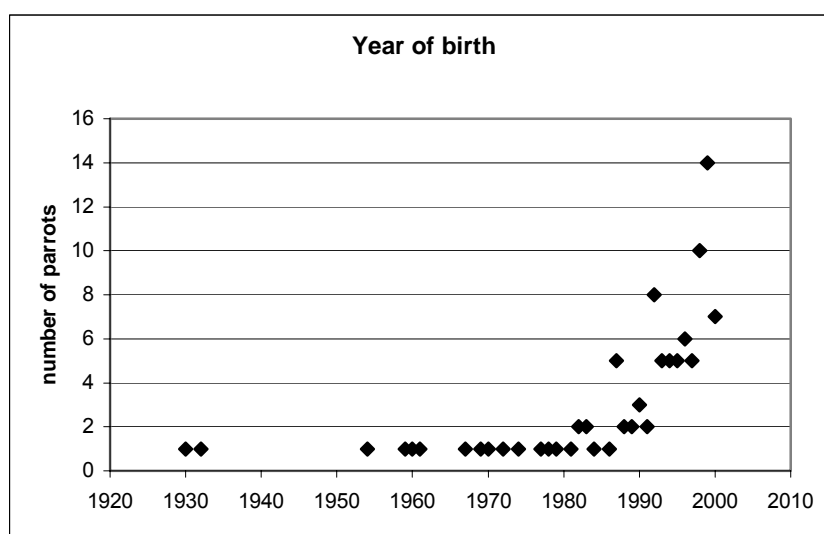


Figure 7-1

Health: 6 parrots were ill (5 of these birds were taking medicines, mostly antibiotics). 22 birds were not perfectly healthy and showed some symptoms during the visit (mostly respiratory distress), though they were not treated for them and did not suffer from a diagnosed disease. The remaining 76 parrots of the study were free from symptoms and seemed fit and healthy when we visited the owners.

15 parrots had one or several red feathers in the grey parts of their plumage, which led us to think of the presence of metabolic problems or nutritional deficiencies.

Only 58 parrots had not been ill since they arrived at the current owners'. Accordingly, 62 birds had never taken any medicine at all. 42 parrots had already undergone an operation. Most of those parrots (33 birds) were subjected to an endoscopy, 5 were operated on for a tumour or a granuloma, 2 birds had a biopsy done on them (liver, kidney) and the rest underwent minor operations. Only 26 parrots had never been to the vet. 58 had done so at the most three times and 21 birds had been on more frequent visits.

7.1.3 PAST EXPERIENCES OF THE SUBJECTS

Acquisition of the parrots: 55 birds were bought directly at breeders', 15 at pet shops, 25 at the previous owners' and 6 were purchased at other places.

The owners bought African grey parrots for several different reasons. 22 were fascinated by the behaviour or the character of parrots and 18 owners answered spontaneously that keeping a parrot had

been one of their greatest childhood dreams. 11 persons rescued the bird from previous owners or bought it at a pet shop out of compassion or pity. 4 persons caught sight of the grey parrot in a pet shop and came back after some reflection to buy it. 5 owners opted for an African grey parrot as a pet, as they wanted an animal "that is able to speak" and chose that species because of its very good mimicry ability. 6 persons were given the bird as a present. 5 owners wanted a pet that would keep them company and 4 of them purchased that species because they saw one at friends'. 2 persons bought the parrot as a companion for another bird. 2 owners chose a parrot as they were allergic to fur. Finally, 24 owners bought their birds for various other reasons.

Age at the time of purchase: it logically depends on whether or not there have been previous owners as well as on the breeding method of the parrots (hand-reared parrots tend to be sold quite young). 27 birds were bought when they were less than 3 months old (not weaned yet), 34 were sold when they were 3 to 6 months of age, 9 birds at 6 to 12 months old, 9 from 1 to 4 years old, 8 birds were between 4 and 10 years old and finally 13 parrots were over 10 at the time of their acquisition.

Previous owners: 32 grey parrots participating in the study had had previous owners. 15 of the 32 birds had had only 1 previous owner, 12 had had between 2 and 5 former owners and the number of previous owners was unknown in 5 cases.

Care at previous owners': it was then evaluated and the following results came out: only 3 birds could be classified in the category "excellent", the "average" group concerned 6 parrots, 13 birds belonged to the group "bad" and the situation could not be clarified for 10 birds (see chapter 6.3). There was a clearly positive change of housing (by the current owner) for 14 birds. That of 17 birds was very similar at the previous and current owners'.

Behaviour at the time of purchase: it logically depended on the past of the subjects and how they had been bred.

- 77 parrots were already tame when the owners bought them.
- 73 birds were, according to the owners, "at ease" and rather relaxed.
- 69 were "friendly" and tried to come into contact with the owners.
- 75 birds were curious.
- 43 parrots were timid or scared and avoided all contact with human beings.
- 21 birds were aggressive.
- 11 birds looked as though they were indifferent to their new environment and the new people around them.

The method applied by the owner to create a contact with the bird and to tame it also depended on the bird's original behaviour and its breeding method. 47 owners talked calmly to the bird without trying to touch it, 22 people touched the bird outside its cage, 10 owners touched the bird directly in its cage, 19 bird keepers gave treats to the parrots inside the cage and 7 outside it.

7.1.4 BEHAVIOUR OF THE SUBJECTS

Aggressiveness: the aggressiveness of the birds was evaluated using several criteria, as already described in chapter 6.3. The synthesis of all those different factors allowed the classification of the birds regarding aggressiveness. 12 parrots were considered to be very aggressive (biting the owners, attacking intruders or even the owners by flying at them), 9 birds were more aggressive than most "average" grey parrots and 3 parrots used to be aggressive although the problem had been solved by the time of the study. Finally, the remaining 81 birds were not considered to be aggressive. For some

results, the birds were divided into two groups, either "very aggressive" containing 12 birds and the rest of the birds in a "not very aggressive" group, or "aggressive" with 22 birds and the remaining birds in a "not aggressive" group. 13 birds had already attacked the owner, the family or strangers by flying at them.

According to the owners, 65 subjects clearly warned with their body language before pecking, which means that these owners observed their birds and were able to decode the parrots' visual signals. 18 grey parrots were considered by the owner to be "false", which means for example that the bird bowed its head and pretended to want to be scratched and then suddenly turned round and bit without warning.

7 birds were aggressive towards other pets (2 parrots towards cats, 4 towards dogs and one subject killed the owner's canary) and 9 birds attacked other parrots. 3 birds were aggressive towards everyone and 9 were aggressive towards everybody except the owner.

Regarding the aggressiveness towards the owner, 33 parrots sometimes bite their human partner making him/her bleed, 5 birds used to bite their favourite person when they were younger and have stopped doing so since then and the remaining 64 birds never (or very exceptionally and only for good reasons) bite their owners until they bleed. 30 parrots have, according to their owners, never bitten anybody. This criterion was not used to sort out the subjects regarding their aggressiveness, as it mainly depends on the bird keeper's reaction or on her/his approach to the parrot.

26 owners noticed a cyclical change in their bird's aggressiveness, most of the time either once a year during the cold season or in spring, probably following the bird's hormonal changes (14 birds), or according to the cycle of the moon (8 birds, usually more aggressive at full moon). Other birds seemed to react to changing weather, to their moult, or to health problems.

Aggressiveness towards objects: 5 of the 11 birds having a mirror in their cage attacked it. 34 birds were sometimes aggressive towards specific objects in their environments. Here is a list of those items with the number of birds concerned in brackets: toys (6), anything red (2), spray (2), vacuum-cleaners (2), sticks (5), music boxes (1), plastic bottles (2), ropes (2), spoons (1), bells (1), any objects on the cage (1), egg-shaped objects (1), slippers (2), bowls of water (1), rolls of paper (2), bunches of keys (1), alarm clocks (1), kitchen cloths (1), a black skirting board (1).

The reasons why, according to the bird keeper, the parrot bites, are represented in figure 7-2. The owners could give several reasons to explain their parrots' behaviour.

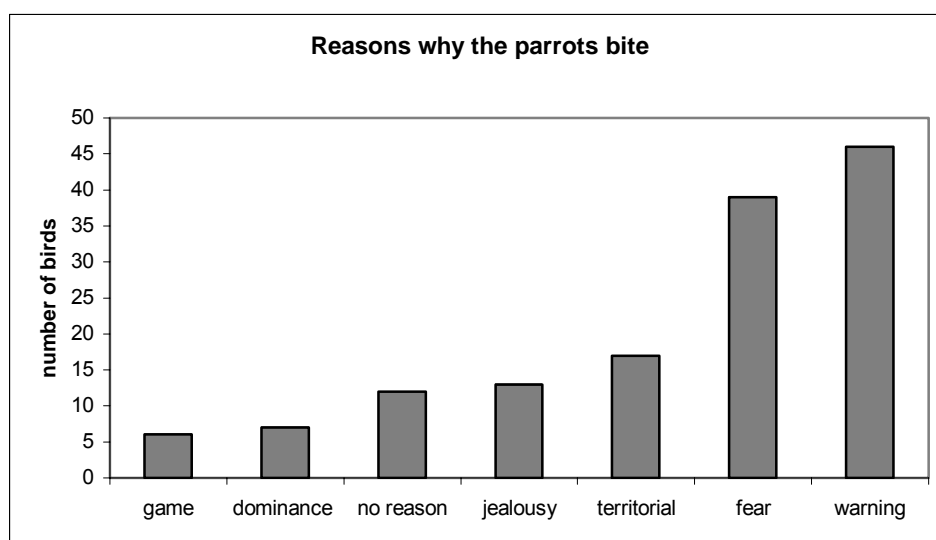


Figure 7-2

Screeching, screaming and mechanically produced noises: the owner's answer to the question "do you believe your bird to be abnormally noisy?" needed to be re-examined after the visit, considering the frequency of the noise, its duration, the type of noise made and the possible circumstances that triggered the behaviour. In our mind, only 4 of the African grey parrots were truly screechers. The behaviour of 8 other parrots was a real problem for the owner, though these birds could not be considered to be real screechers.

As both groups were problematic in the owners' eyes, the birds that were real screechers, as well as the parrots whose behaviour was a problem for the owner, were both considered to have that problem and were categorized in the "screecher" group. 2 birds used to screech and the owner had been able to solve the problem before the study began.

Regarding mechanical noises made by the parrots, such as pulling on the bars of the cage, or shaking or lifting their bowls, they are usually attention-demanding behaviours and are triggered by the owners' reaction. None of the 16 birds that had that behaviour was problematic for the owners, as they made such noises to draw attention, most of the time in specific situations, for example during meals (especially if the parrot got food from the owner).

Feather picking: 52 parrots had already picked or still picked their feathers. Looking at the current situation of the birds that had already had that behaviour, 31 parrots still picked their feathers at the time of the visit to the owners. 9 birds occasionally (rarely or only in particular situations, such as earth tremors or the owner's holidays) picked their feathers. The situation was unclear for 5 subjects, as their owners explained the state of their plumage by the birds' bad health or had never noticed any feather picking, though the parrots' plumage clearly appeared abnormal. The 7 remaining birds had stopped picking their feathers by the time of the visit.

The different stages of feather picking (currently and the worst stage ever reached) are represented in figure 7-3 (see chapter 6.3).

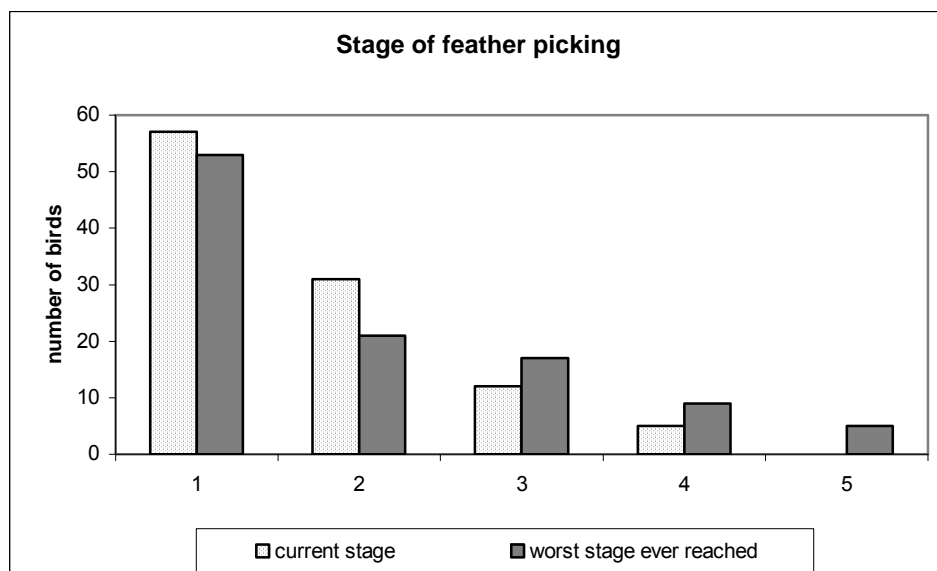


Figure 7-3

The method the birds used to pick their feathers varied depending on the parrot. 24 subjects plucked their feathers, usually leaving the skin naked without any down left. 15 birds chewed their feathers, giving the plumage a dishevelled appearance. 5 grey parrots both chewed and plucked their feathers, depending on the circumstance that triggered the behaviour or depending on the part of the body affected. The situation was not clear in the case of 8 birds.

The cause for feather picking was unclear in most cases (25 birds). In every case, only the first cause that triggered the behaviour was taken into consideration, not the ones that maintained it (e.g. "bad habit").

- For 8 subjects, the main trigger seemed to be sexual or social frustration. Those birds began with this behavioural problem when they became sexually mature (6 parrots at 2-3 years old, 2 birds at 6-7 years old) and feather picking was cyclical as well in some cases. What was also very important to take into consideration before cataloguing the parrots into the group of "social frustration" was their social environment, the type of relationship with the owner and other signs of frustration or attention-seeking behaviour displayed by the parrot.
- 4 birds obviously had health problems, which were, at least partially, responsible for feather picking. Two of them were in a very bad condition, one of them had had aspergillosis for years and the other was very thin, had some reddened feathers (apart from the tail feathers) and began picking its feathers when the health problems started (the owner had not taken it to the vet yet at the time of the visit). The third bird had a non-diagnosed disease (possibly PBFD: *psittacine beak and feather disease*) with chronic feather malformation. The last bird had been taken to the vet years before. He had diagnosed an illness (the owner did not remember what sort of disease the vet spoke about) that had caused the partial loss of the bird's feathers.
- 15 parrots reacted to any stress or traumatism by feather picking. There were many different situations that we considered to be stressful for the birds. Those circumstances were: purchase of another (more dominant) grey parrot (2 birds), loss of the other parrot (1), loss of the owner (1), owner's holidays (2), stays at the vet's (1), stressful past (battered bird, awful housing) (2), owner suffering from a depression or having had an accident (2), tense atmosphere between members of the family (1), owner moving to another flat (1), earth tremors (2).

The reaction of the owner was also taken into consideration. 30 bird keepers ignored the bird when they spotted it picking its feathers, which is the right attitude to have. Others scolded the bird or tried to make it stop (9 birds). What they actually did is give attention to the bird (understood as a reward) and therefore enhance the behaviour. That leads feather picking to become an attention-demanding type of behaviour even if the parrot did not do it for that reason at first. 13 owners could not describe clearly their reaction to feather picking or kept changing their attitude.

Stereotypic behaviour: 28 birds made repetitive movements, either observed during the visit or previously witnessed and described by the owner. It was very difficult to judge if those movements were stereotypic or not. A thorough examination on a video tape would have been very useful to help consider the situation. Unfortunately, there was neither time nor means to fully analyse the behaviour. For example, most of the time it was impossible to determine if the movements could be interrupted or not, which is one of the main conditions to differentiate a stereotypy from other repetitive movements. Nevertheless, all repetitive movements could be classified in "most probably stereotypy or on the way to becoming so" and "no stereotypy".

The stereotypies encountered when studying these birds are described further down in the text and therefore are not also mentioned here (see 7.2.3).

Nervous repetitive habit, displacement activity: those movements are not stereotypic. They are usually triggered by a situation that the bird perceives as being very stressful (such as standing too close to humans) and are quite normal reactions in those circumstances. Those habits are not considered to be behavioural problems, unlike stereotypic movements.

Most parrots develop to a certain extent such nervous habits (as displacement activities) when they face a stressful situation. But those repetitive movements usually do not become a habit for the birds, unless they are especially often exposed to the stimulus or are very sensitive. 18 grey parrots showed one or several nervous habits excessively often (usually several times during the visit). 7 birds

nervously nodded their heads (with their heads straight forward or bowed), 3 parrots shook their heads, 6 birds nervously scratched their heads with their claws, 2 subjects shook their feet (or one foot) in the air in front of them, 2 birds gnawed their claws and one rubbed its beak very often against its perch.

Anxiety: grey parrots can develop an extremely strong fear of a specific object, person, animal or situation. The birds panic when they have to face the specific trigger and they are only able to calm down when the cause is out of sight. None of the birds that participated in the study had acquired a real "phobia", which must be considered as a behavioural problem. Fear seldom seemed to give any cause of concern or any problems to the owners. 26 parrots had developed such anxiety. 4 parrots were very frightened of animals (dogs, cats, birds of prey or crows), 18 of different objects (often in relation with their importation), 2 of one particular person and 2 birds were terrified of earth tremors.

Infantile behaviour: 31 parrots begged for food. Among them, 3 birds begged of another parrot and 28 of the owner. 21 owners (of these 31 birds) reacted to the behaviour by feeding the bird, which probably did not improve matters. The owners of 49 grey parrots sometimes gave them treats directly from the mouth into the bird's beak, which subsequently increased begging.

Allofeeding: 65 parrots regurgitated food for the owner. 50 of them gave the regurgitated food exclusively to their main bond, 11 also gave it to other persons apart from the owner, 3 birds dropped it in the cage and one subject gave the food to several people and to a plastic duck as well.

Sexual partners: 29 parrots considered their owners as their sexual partners and were sexually active with them, by mounting on their hands or shoes. 4 other birds were sexually active with the owners and also masturbated. 4 birds only masturbated and the remaining 68 grey parrots were sexually neutral (inactive) with the bird keepers. 58 parrots paid court to the owners. 29 owners described a behavioural pattern that bore resemblance to courtship without knowing exactly what it was.

Concerning sexual behaviour with other parrots, 58 subjects were kept alone and therefore did not have the opportunity to be sexually active with a bird. 14 birds chose another parrot (most of the time an African grey parrot) as a sexual partner. 10 birds presumably led a normal sexual life with another bird, though the owners could never clearly observe copulation. In spite of the fact that they were kept with other parrots, 23 birds did not show any sexual behavioural patterns with those birds (apart from allofeeding).

19 parrots had changed their bond and had had partners belonging to different species (humans and parrots). 77 parrots chose only one species (human, parrot or another bird species) and the situation was not clear for 9 birds, due to their unknown past.

Considering the partner the parrots chose as their main bond (without taking into account the birds' social contact with other parrots), 74 birds chose a human being as a partner, 14 birds selected another grey parrot and 7 subjects did not have any partner. 10 parrots had a very unclear bond and seemed to have chosen two partners, a human being and a parrot at the same time.

Sexual activity: altogether, 55 birds were sexually active, either with another parrot or with a human being. The 50 remaining birds behaved as if they were asexual or neutered.

Laying: 4 females had already laid eggs sporadically. 2 other females had already laid eggs several times (about 30 eggs over the years for one bird and 13 eggs for the other) and one was a chronic layer and had laid over 21 eggs one after the other, even though the owner had left the clutches in the nesting box to allow the female to brood.

Selective behaviour towards human beings: the parrots that participated in the study were more or less equally distributed in the different stages of selective behaviour (see chapter 6.3). 26 birds were categorized in the first group (anybody can approach or touch the parrot), 23 in the second (only

members of the family can scratch or hold the bird), 31 in the third group (only members of the family, with a clear preference for the owner) and 24 in the fourth category (only the owner can approach or touch the bird).

Selective behaviour towards one particular sex: most of the parrots (66) did not show any preference or aggressiveness towards one sex in particular. 3 parrots were aggressive only towards women, as against 12 birds that were aggressive towards men. As regarding their preference (such as an inclination to climb only onto men's hands, for example), 12 birds preferred women and 12 parrots preferred men.

Docility: the distribution of the birds' docility with strangers and with the owner is represented in figure 7-4 (group 1: impossible to touch the parrot, group 4: the most docile birds. For more details see chapter 6.3).

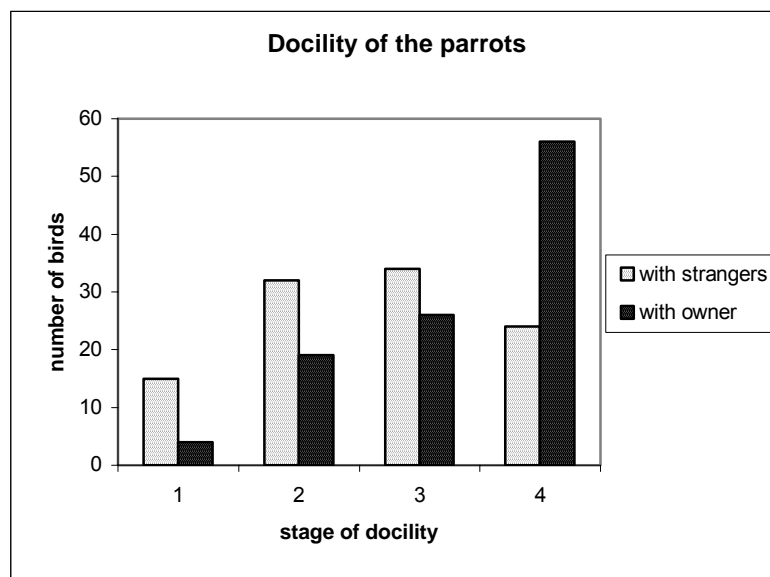


Figure 7-4

Mimicry ability: only two birds did not imitate anything at all. 97 birds mimicked sounds, 99 grey parrots imitated words as well, and 77 of them reproduced the right intonation of different voices. 53 parrots were able to imitate whole sentences. 87 birds could use words or sentences according to the situation.

The quickest parrots began reproducing the human voice at the age of 4 months. Although the young parrots seemed to be more skilled in learning new words, some older subjects still had the capacity for learning to imitate sounds (3 grey parrots began speaking at about 13 years old and another one at 9 years old).

In figure 7-5, group 1 includes the parrots that did not imitate anything at all, the birds in group 2 imitated noises or very few words, group 3 contains the subjects that imitated many words and the parrots in group 4 imitated noises, words and whole sentences. 23 owners specially taught their parrots words, sentences or songs by repeating them very often. All the birds began imitating spontaneously and the birds that were taught to talk did not imitate better than the other birds.

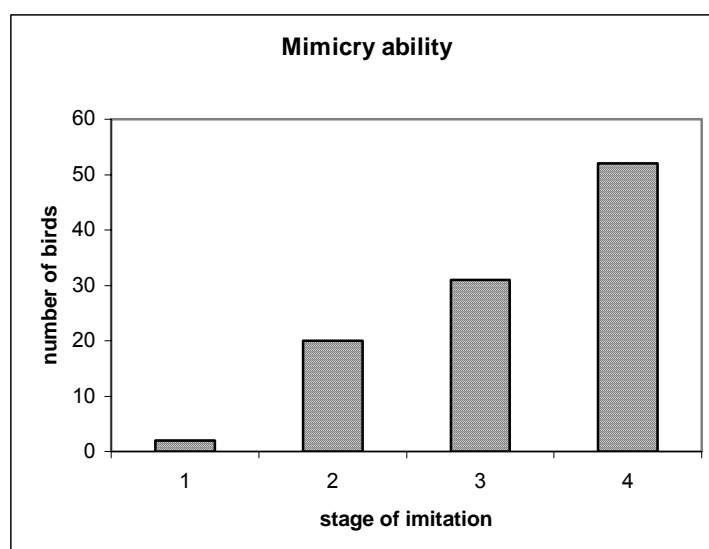


Figure 7-5

Abnormal Activity: an abnormal activity of the parrots could be detected thanks to the observations at the owners' and to their descriptions of the birds' history and behaviour.

- 6 parrots were clearly hyperactive. They had all been hand-raised and had other behavioural problems as well.
- 4 hand-reared birds showed signs of hyper sexuality.
- 2 birds (one Swiss-bred with an unknown breeding method and one hand-reared) appeared to be apathetic, though they were kept in rather stimulating environments compared with the other birds taking part in the study (one of them was kept with another grey parrot and the other one in an outdoor aviary next to other parrots).
- One hand-reared subject wolfed down its food ration just after being fed every day, probably due to its former housing, with very bad care and hygiene.
- 3 hand-reared birds always "tested" fingers with their beaks before climbing on anybody's hands. That habit is most probably a sign of great insecurity and distress.
- One wild-caught parrot blew and panted every time somebody approached it, presumably out of fear.

Problems for the owner: 28 owners reckoned the housing of their grey parrots was problematic for different reasons (often several problems per bird keeper), such as: their parrots' aggressiveness (4 birds), feather picking (15), screeching (4), a too selective behaviour (8), regurgitating too often (2), sexually active with people (1), not tame enough (1), dust/furniture damaged (6), imitation of coarse language (1), jealousy (3), non-acceptance of the owner as main bond (1), high social needs (1), dominance (1), bad health (2), re-socialization problem or inharmonious couple of birds (4) or owner's bad conscience about owning an exotic animal (7).

Besides, 21 owners (not necessarily the same bird keepers that alluded to a real problem concerning the parrots' housing, see above) admitted spontaneously during the interview that they would not have chosen an African grey parrot, or that they would have bought two parrots directly if they had realised the parrot's needs at the time of purchase.

8 owners had never done anything special to solve the problem. 13 of them went to the vet (most of the time because of feather picking), 2 went to a behavioural consultant, 2 went to an aviculturist's, 3 owners bought books or found information on the internet, 8 persons purchased another grey parrot as

a partner for their bird, 6 changed the housing of the bird and one trained the parrot. 11 owners solved the problem using other methods.

Other pets: at the time of the visit to the owner, 79 grey parrots were kept with other pets (fig. 7-6) (considered as pets were only animals that interact with the owner. Snakes, for example, did not count as pets). 3 owners had just purchased a pet (new situation) and 8 used to possess a pet before our visit. The grey parrot was the only animal in 15 households. As you can see in figure 7-6, 36 African grey parrots were kept with one or several other grey parrots at the time of the visit. But, as the birds that were kept in couples in one household often both participated in the study, that number does not represent the percentage of parrots that are kept with a companion of the same species. Considering the 94 households (and not only the number of parrots), merely 29 grey parrots (30.9%) were kept with another grey parrot.

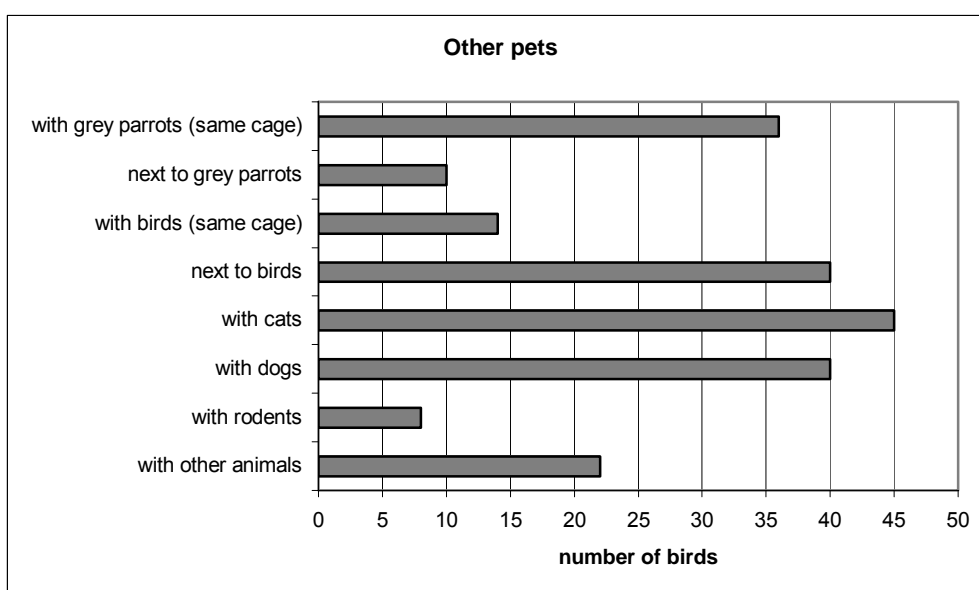


Figure 7-6

Contact with other grey parrots: 38 parrots that were kept alone had never had any contact with another African grey parrot (even during holidays). 28 birds that were kept alone had already been in contact on one or several occasions with other grey parrots.

7.1.5 CARE AND HOUSING OF THE SUBJECTS

Sex of the bird keepers: owners (i.e. the people, who take care of the parrots) were mostly women (72), as against only 33 men.

Presence of the owners at home: most of them stayed home the whole day (44 owners). 17 bird keepers stayed home half the day (afternoons or mornings). 32 owners worked every day and were at home for a short time in the mornings and in the evenings. 4 owners worked late in the evenings and were at home about two hours a day. 6 owners were either at home less than two hours a day or the parrot's cage was located in a separate room, into which the owner went only to feed the bird. 2 owners had moved out just before we visited them. The bird had not yet found another partner in the household.

Presence of the families: 31 parrots had the company of the families all day, 7 either mornings or afternoons. The families of 33 bird keepers were at home only in the early morning and in the evening and 7 of them were present only for a couple of hours a day. 27 owners lived alone.

Type of relationship: according to the observation of the interactions between the owners and their parrots, 39 owners had a rather distant relationship with their birds. They only came into contact with them to feed them or clean their cages. 44 owners maintained an intensive relationship with their parrots. 22 persons had a very strong bond with their parrots, were always at home with them and were mostly single.

Owners' availability for their birds: this criterion is rather subjective, as it is very difficult for the bird keepers to work out an approximation of the average time they spend daily looking after their birds. 42 owners spent less than 1 hour a day (including the cleaning of the cage and the feeding of the parrot), 29 owners spent about an hour a day with their parrots, 22 owners estimated that they spent between 2 and 3 hours a day to take care of their birds and 12 owners reckoned they spent more than 3 hours with their parrots. 32 owners came into contact with their birds only while cleaning the cages and feeding the birds.

Owners' approach to the parrot: this was really totally inappropriate (owners impatient and brutal, jerky movements) in two cases. 28 owners had an approach to the bird that was not perfect (owners impatient, nervous, irritable, noisy or moving abruptly) and 59 owners had the right attitude towards their birds. The situation was unknown for 16 parrots.

Training: no parrots that participated in the study had been taught the "up" and "down" commands or any sort of training method that are widespread especially in North America. Nevertheless, 36 owners tried to train their birds to follow certain rules or orders, such as becoming potty-trained (27) or trained the parrot to come on command (9). 13 owners did not always respect the birds' individual distance by, for example, scratching the parrots' heads even when they clearly showed that they were not in the right mood.

The owners' reactions to unwanted or bad behaviour of the birds: 39 owners shouted at the birds, 35 persons said firmly "no", 21 ignored the parrots and tried not to react, 17 owners covered their cages, 14 persons put the birds back into their cages, 12 owners physically punished them (by throwing an object at them, or spraying them with water), 11 owners left the room for a while and 12 owners tried to distract the birds with gestures or noises.

Housing: 61 birds were kept in cages, 27 were housed in aviaries (sizes as from 100x100x200 cm were considered as aviaries), 13 were lodged in cages or aviaries, but were free at any time to come out and move around freely and 4 birds were kept on portable perches/trees.

The cages have been divided into three groups according to their size:

- 1: 40x40x60 cm (11 parrots)
- 2: 60x80x100 cm (39 parrots)
- 3: 80x120x100 cm (11 birds)

The aviaries have been divided into the following categories:

- 4: 100x100x200 cm (8 parrots)
- 5: 100x200x200 cm (4 birds)
- 6: bigger than 100x200x200 cm (15 parrots)
- 7: parrots always free (13 birds)

Wire mesh: the wire mesh of 20 cages was shiny silver, that of 30 cages was matt silver, and 30 cages were painted shiny gold and 5 in matt gold. 8 cages were painted different colours (dark green, black, blue or white).

Shape of the cage: 47 cages were rectangular, 45 cages were rectangular with rounded corners and 2 cages were round.

Number of perches: 1 bird had one single perch in its cage, 10 parrots had 2 perches, 28 subjects had 3 perches and the remaining 64 parrots had more than 3 perches at their disposal. The perches were made out of different materials, such as branches with varying diameters and with bark on (81 birds had at least one such perch in their cages), standard manufactured perches (55 birds), synthetic perches (7 birds) and concrete perches (2 birds). 65 parrots had perches of different diameters in their cages. Besides, 54 parrots had the opportunity to perch outside their cages (on a tree or on a portable perch).

The height of the perches: the highest perch inside or outside the birds' cages was taken into consideration. 47 birds could perch higher than the owner's eye level.

Location of the cage: 11 cages were placed in the middle of a room and could be reached from all sides, 24 were located next to a window, through which the bird could watch things outside the house, 35 cages were adjacent to a wall and 26 cages were placed in a corner of the room (without any windows).

Cage covered at night: 34 owners covered the birds' cages every night.

Bathing/spraying: 22 birds always had a bowl of water at their disposal, 14 birds could bathe only on certain occasions or in the warm season and 69 parrots did not have basins in their cages. Besides, 67 parrots often got sprayed (every week or more often), 17 birds very rarely (at the most, every second week) and 21 owners never sprayed their parrots. If we take into consideration the frequency of both bathing and spraying, 74 parrots could shower or bathe often enough, 31 birds too seldom (less than once every second week) or never.

Toys inside the cage: 60 parrots had many toys in their cages, with which they played. 28 birds had either only one toy at their disposal or many toys but did not use them. 17 birds did not have any toys in their cages.

Toys outside the cage: 34 parrots had many toys available outside their cages, 10 birds had only one toy or did not play with their toys, and 60 subjects did not have any toys to play with when they were outside their cages.

Occupation: 22 birds were well occupied (i.e. had new branches given more than twice a year and had many toys inside and outside the cages), 62 birds had an average entertainment level in their cages (i.e. either many toys or branches put frequently into the cages). 21 subjects lived in a rather dull environment without enough occupation (i.e. one/no toy at all and seldom/never new branches). 11 birds had a mirror in their cages. 35 owners left the radio and 4 the television on during the day.

Changes in the disposition of things in the cage, frequency of putting new objects into the cage: 50 owners never changed anything in the cages, 23 did so approximately once a year (mostly to replace old perches), 25 changed the accessories in the cages about once a month and 6 bird keepers changed the configuration more often.

Stimulation in a bird's environment: the evaluation of the stimulation was based on many criteria: if the parrot had two different cages, if it was housed in an outdoor aviary, if the bird went on holidays or outings with the owner, how often the bird was free outside its cage and the opportunity for the bird to have its cage moved onto the balcony (for details, see chapter 6.3). The stimulation was excellent for 61 parrots, sufficient for 27 subjects and inadequate for 17 birds.

Room, in which the parrot stayed most of the time: 68 parrots lived in a room which was inhabited and 27 birds were housed in a separate room with very little contact with humans.

Flight ability: 72 parrots were able to fly. Among the parrots that could not fly, most had had either their wing feathers clipped, had picked their primary feathers, or had their breast muscles fully atrophied (mostly if they never had the opportunity to get out of their cages or to fly). 12 parrots had had their primary feathers clipped at the time of the visit to the owners'. 25 subjects had already had their wing feathers trimmed, though they had grown by the time of the visit and 65 birds never had their wing feathers clipped. Only 5 birds had had their feathers shortened only on one side (asymmetrically).

Litter: different materials were used as litter in the birds' cages. 23 parrots had no litter at all in their cages, 39 birds had paper at the bottom of their cages and 43 had litter (13: sand, 22: wood shavings, 3: paper pellets, 2: cat litter, 2: maize pellets, 1: straw). Most of the owners (50 persons) changed the litter of the cage every day, 21 twice a week, 20 once a week and 4 more seldom. Moreover, 56 birds had the opportunity to eat grit or sand.

Exposure to the sun: 9 cages were placed in rather dark rooms and 23 in very bright and exposed ones. 53 parrots were not exposed daily to the sun, 41 were exposed to the sun, but could still choose between shade and sun. The cages of 11 birds were put daily in the sun without any opportunity for the bird to go back into the shade.

Length of daylight: 7 birds had daylight for 9 to 11 hours a day, 36 had daylight for 12 to 14 hours daily and 46 birds for more than 15 hours a day. The situation for 16 parrots was very variable, depending on the season or on the owners' activities.

Humidity: though the level of humidity at the owner's was measured during the visit, it was more representative to ask the bird keeper if a humidifier was used, as it gives information about the level of humidity throughout the year. 38 parrots were kept in rooms with a low percentage of humidity (30-40%), especially in winter (no humidifier), 57 subjects were kept in the room of the house containing a humidifier (45-60%) and 10 parrots were kept in a very humid environment (more than 60%).

Smoke: 22 owners smoked in the same room as the bird's cage, 12 bird keepers smoked occasionally or only guests smoked in the room where the cage was located and 71 owners did not smoke at all.

Freedom outside the cage: 19 parrots were always free outside their cages and could move about freely, 19 parrots were free several times a day for short periods, 29 parrots were free for a certain length of time every day, 16 birds 2 or 3 times a week, 4 subjects once a week and 4 birds were free 2 or 3 times a month. 14 parrots never had the possibility of leaving their cages.

Length of time: 54 parrots were free more than 3 hours a day or during the whole day, 23 birds were free at the most 2 hours a day and 12 parrots were free only for about half an hour each time. If you consider both the frequency and the length of time the parrots were allowed to spend outside their cages, 61 birds were free on a daily basis for more than half an hour, 22 subjects were free 2-3 times a week or every day for at the most half an hour, and 22 birds were free once a week or more seldom.

Free out of doors: 22 parrots were sometimes (in good weather) free outside. 11 birds used to be allowed to go outdoors before and 72 birds had never had that possibility. Besides, 14 birds accompanied their owners to visit their friends or on outings in the car. The parrots' cages were moved daily outside the house respectively the birds have outdoor aviaries in 54 cases. 22 birds had sometimes (not daily) the opportunity to have their cages placed outside.

Holidays: 41 birds stayed at home when the owner went on holidays, 41 were looked after by somebody else (aviculturist (4), pet shop (9), friend (18), family (8), vet (1), placed in an aviary (1)). 8 owners always took their parrots on holiday with them and 15 others sometimes did. 22 owners had never been on holiday since they purchased the parrot.

Shows: 4 birds (all of them belonging to the "not hand-reared" category) had already participated in bird shows.

Diet: 33 owners fed their birds on a balanced diet. 37 birds were fed on an "average" diet (not perfectly balanced, see 6.3) and 35 birds got a fully inappropriate diet. 31 parrots were given leftovers or the same food as the owners (such as chicken, biscuits, cakes, yoghurt, pudding, bread with jam, cheese, cream, coffee, chocolate, marzipan, salami, ice cream, meat, fish, sausages, garlic, salad with sauce, coke...) on a daily basis. 13 birds were sometimes fed on leftovers. 2 birds used to be fed on human food only at previous owners' and 59 parrots had never been fed on such inappropriate food.

Location of the bowl of food: 4 birds had their bowls positioned very high up in the cages, 57 parrots had them placed in the middle of their cages and 44 birds had to go to the bottom of their cages to eat.

Branches: 20 owners placed new fresh branches or twigs (with leaves on them) several times a week into the birds' cages, 14 put new branches once a week into the cages, 23 gave the parrots a new branch about once a month, 15 put a new branch more seldom and 19 owners never gave branches to the parrots. Besides, 14 parrots always had a branch (without leaves) in their cages, which was seldom changed (when the bark had been totally peeled off).

7.2 BREEDING METHODS OF THE BIRDS

7.2.1 CATEGORIES

The parrots have been divided into three main groups: hand-reared parrots (64 subjects), parent-bred (13) and wild-caught parrots (26). Two parrots were bred in Switzerland, though it was not clear if they had been hand-raised or not and therefore could not be used in that classification.

Since the "parent-bred" division contains only 13 birds, it has been very useful for certain questions to group it with one of the other categories, hence the divisions: "hand-reared" (64) and "not hand-reared" (39) and for other enquiries: "imported" (26) and "not imported" (79) (note: in this work, "imported parrots" is equivalent to "wild-caught parrots").

7.2.2 DISTRIBUTION OF CONFOUNDERS IN EACH GROUP

Age: the wild-caught parrots were significantly older than the not imported birds. As shown in the histogram below, the hand-reared and parent-bred birds were relatively young and had a very similar distribution as regarding their age (fig. 7-7).

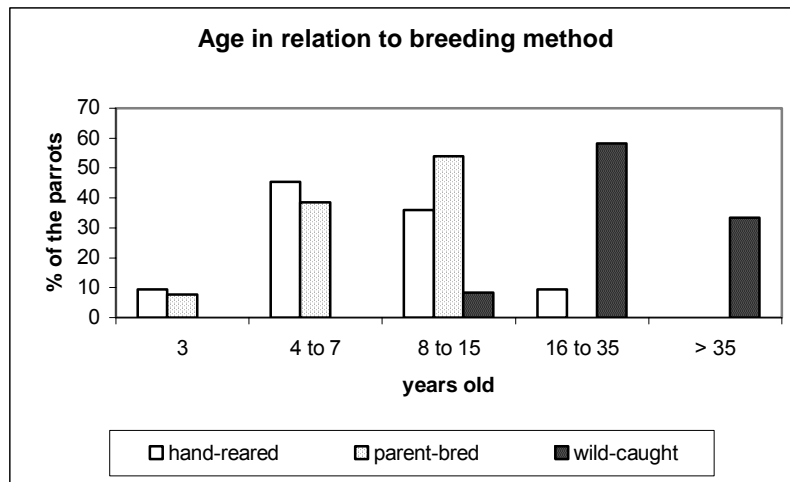


Figure 7-7

Age at the time of purchase: the hand-reared parrots had been bought usually before weaning or as fledglings. On the other hand, most of the wild-caught subjects had been purchased when they were much older or at an unknown age. As for the parent-bred birds, they had been bought at all sorts of ages (fig. 7-8).

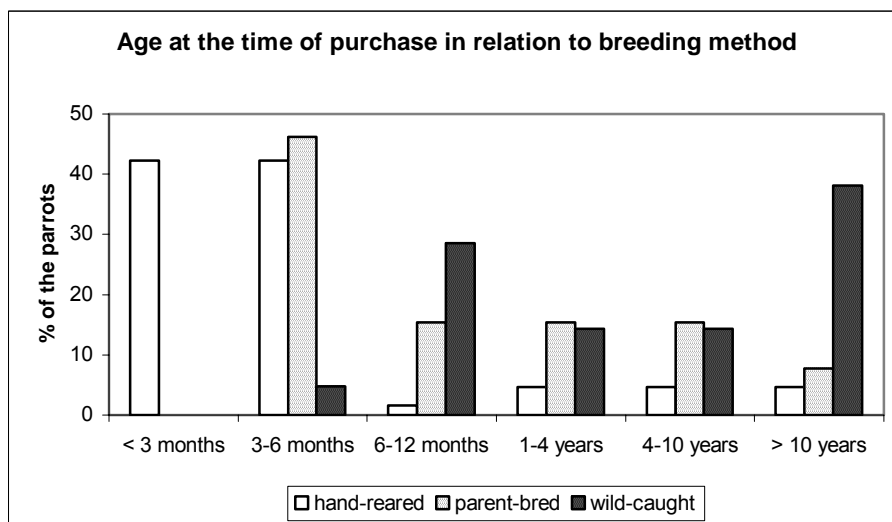


Figure 7-8

As far as the birds' past experiences are concerned, 61.5% of the imported parrots had had previous owners, as against 30.8% of the parent-bred and 15.6% of the hand-reared parrots. This disparity is probably due to the difference of age of the birds in each category.

Taming method: as hand-reared birds are already tame from the beginning, the first approach and taming attempts of the owners are naturally different compared with those that had not been hand-reared. Owners of "not hand-reared" parrots take more time to talk calmly to the birds in order to tame them compared with owners of hand-reared birds ($p = 0.033$). They also give treats in the cage significantly more often ($p = 0.0084$).

With grey parrots: among the birds considered in this study, 28.0 % of the wild-caught parrots were kept with one or many other African grey parrots compared with 39.3% of the hand-reared birds. The parent-bred parrots were kept most of the time (72.7 %) with other grey parrots.

With parrots of other species: the hand-reared parrots were kept significantly more often with parrots of other species compared to the naturally reared birds ($p = 0.008$ FT: Fisher's Exact Test used for this calculation).

Therefore, the sexual partner or the main bond, which the grey parrots chose, was different according to the breeding method applied (fig. 7-9) (see chapter 6.3).

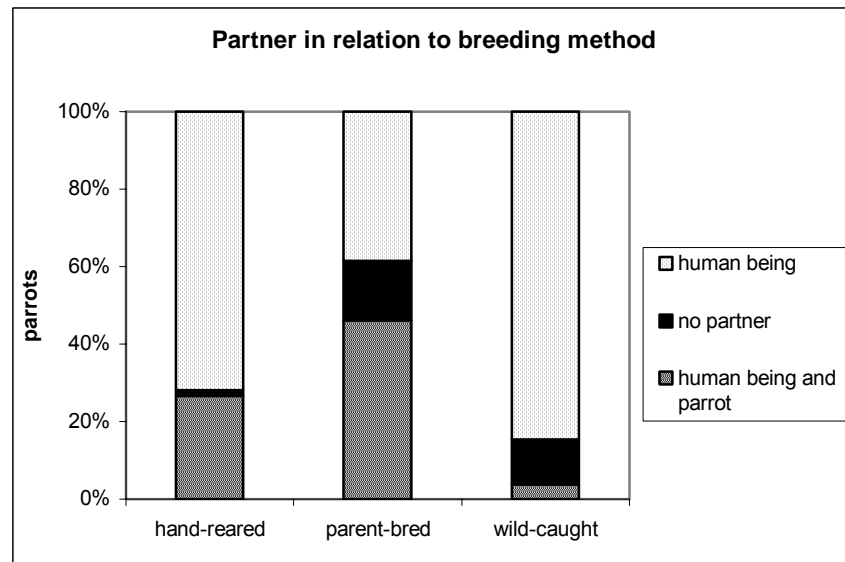


Figure 7-9

The size of the cage: the wild-caught parrots were housed in significantly smaller cages than the not imported birds ($p = 0.0003$ FT), probably because most of them had been purchased many years before the hand-reared and parent-bred birds, at a time when standard cages were much smaller. Accordingly, there were fewer perches in the cages of imported birds and the height of the highest perch tended to be much lower (lower than eye level) than in cages of not imported parrots ($p = 0.0002$).

Ability to fly: there was a very big percentage (57.7%) of imported parrots that were not able to fly compared to the birds that had been bred in captivity (fig. 7-10). 34.5% of the imported parrots had never had the opportunity to fly, as against 10.9% of the hand-reared parrots.

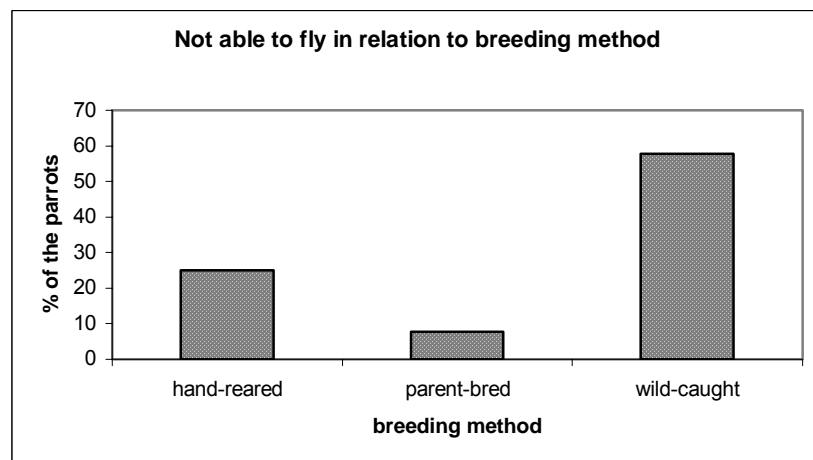


Figure 7-10

Changes in the cage: as we can see in figure 7-11, parent-bred parrots underwent frequent changes in their cages. The changes consisted of having new toys placed in the cage or of moving accessories (perches or toys) inside the cage.

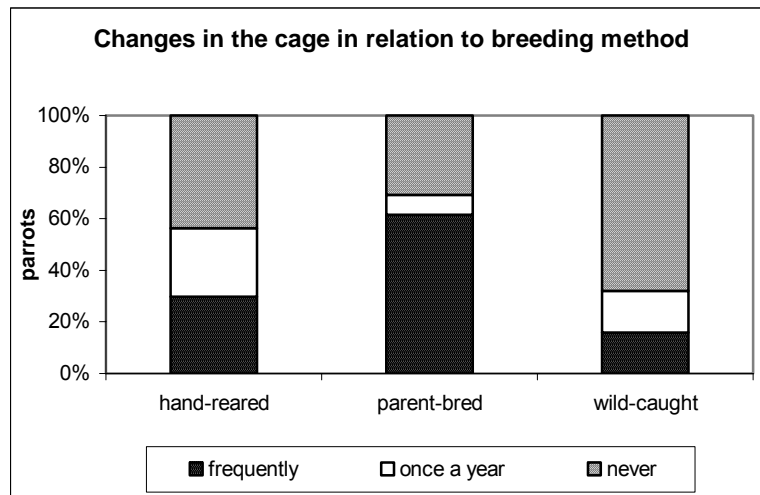


Figure 7-11

Smoke: the owners of imported parrots smoked significantly more than the owners of parrots that had been bred in captivity (47.6% as against 16.7%) ($p = 0.003$).

7.2.3 THE INFLUENCE OF THE BREEDING METHOD ON THE BIRDS' BEHAVIOUR

Aggressiveness and reasons why they bite: hand-reared birds were significantly more aggressive towards humans ($p = 0.027$ FT) than not hand-reared parrots. This result confirms the statements made by many authors regarding the increased aggressiveness of hand-reared parrots (Low, 2001; Lantermann, 1998; Munkes, 2003). They basically react to annoyance or contradiction with (flying-) attacks and aggressiveness much more easily than parent-bred and imported birds. That leads the fearless hand-raised parrots to become aggressive more easily (fig. 7-12 and 7-13).

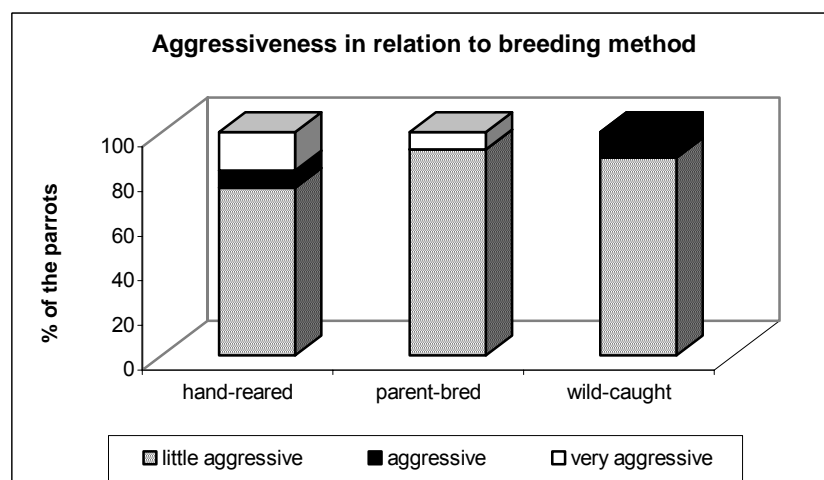


Figure 7-12

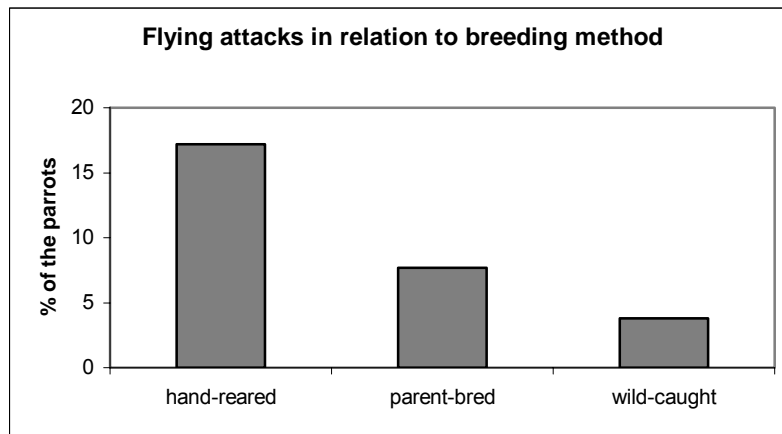


Figure 7-13

The answers of the owners to the open question concerning the reasons why their parrot bit clearly demonstrates that the wild-caught and parent-bred birds bit out of fear and insecurity significantly more often than the hand-reared parrots ($p = 0.0018$).

Besides, the wild-caught parrots had a prominent tendency to display territorial behaviour ($p = 0.099$). According to the owners, 26.9 % of the wild-caught birds bit to defend their territories as against 15.4% of the parent-bred parrots and 10.9 % of the hand-raised birds (fig. 7-14).

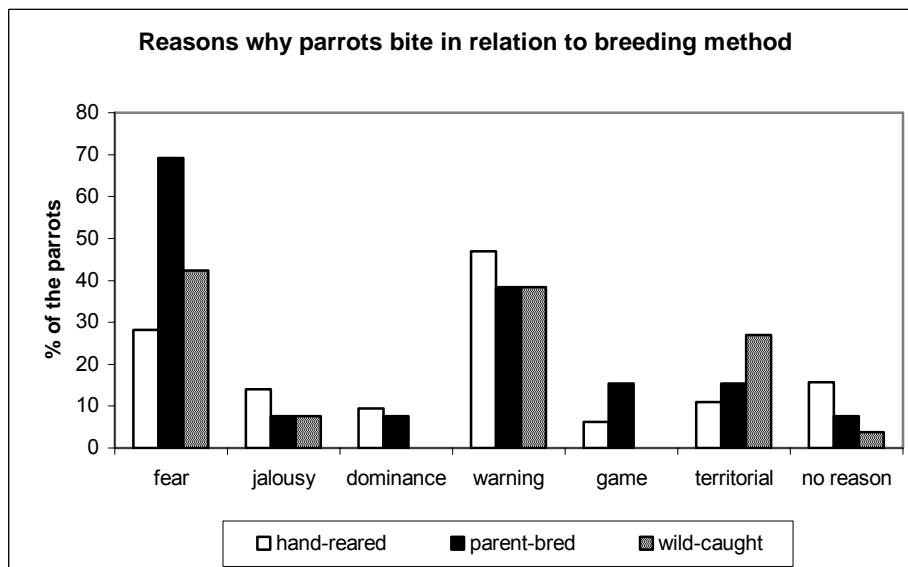


Figure 7-14

In the chart it is also obvious that hand-reared parrots tended to bite more often because of "dominance", "jealousy", "warning" and "no reason". The group "no reason" includes the birds that bite without the owner understanding why.

It is widely known that hand-reared parrots have lost their natural respect of human beings and therefore, rarely bite because of fear. As a result, they often tend to bite to show their dominance or their control over the owner or to defend the owner against "intruders", such as guests or such as the owner's family. That also leads the parrot to bite when the owner does not respect its individual distance, which is an essential aspect of the bird's social behaviour. "Dominance" and "control" are sometimes misunderstood by the owner, who cannot find any reasons to explain the bird's attacks. Many owners who answered "no reason" to the question "why does your parrot bite?" were probably in that category.

The tendency of hand-raised birds to bite because of "jealousy" (the question as to whether parrots are able to feel jealousy is a controversial topic) is probably due to the fact that they dare show their protection for their "human partner". They also consider themselves as being part of the human flock and do not hesitate much before showing the rest of the flock their bond with that particular person. On the contrary, imported and parent-bred parrots usually bite when they feel oppressed or when they are scared.

The tendency of wild-caught birds to become more territorial may be due to the fact that they had been confined to a cage usually longer than the not imported birds (especially compared with the hand-reared parrots) before being released for the first time. Besides, they had been traumatized by capture and importation. As they were terrified by the presence of human beings at the time of purchase, the imported birds probably tried to appropriate a "new" territory (i.e. their cage) very quickly and defended it.

Feather picking: the wild-caught grey parrots still picked or had already picked their feathers significantly more often than the not imported parrots ($p = 0.025$ respectively $p = 0.046$). 42.2% of the hand-reared parrots had already picked their feathers (including the birds that had stopped feather picking), as against 53.8% of the parent-bred birds and 65.4% of the wild-caught parrots. When we visited the owner, 31.1% of the hand-reared parrots picked their feathers, compared with 50.0% of the parent-bred and 56.0% of the wild-caught birds.

Feather picking can be caused by many different factors; some of which are yet to be discovered. It is therefore very difficult to ascertain the reason why the wild-caught birds considered in the study picked their feathers more often than the hand-reared parrots. The stress of importation, the adaptation to a totally new environment, the forced bond with humans and their rather poor health, are most probably responsible for feather picking in the case of many imported grey parrots. As those facts cannot be easily quantified (apart from poor health, which alone did not increase feather picking in the statistical analysis), the hypotheses cannot be certified. Many confounders, such as housing, occupation, social interactions or health of the birds, that were all considerably worse for wild-caught parrots than for hand-reared ones, did not seem to have a direct influence on feather picking. Even age (the wild-caught parrots were significantly older than the not imported birds) did not affect feather preening.

The percentage of parent-bred birds that picked their feathers was between the percentage of hand-reared and imported parrots. As only a small number of parent-bred parrots was available (13 subjects), no conclusions could be drawn concerning their tendency to have such a problem.

The maximal stage of feather picking ever reached in this study was, according to the tendency of wild-caught parrots to pick their feathers, also worse in that category and in the "parent-bred" one (in about the same proportions) ($p = 0.092$). Self-mutilation had only occurred in the group of parrots that had not been hand-reared (fig. 7-15).

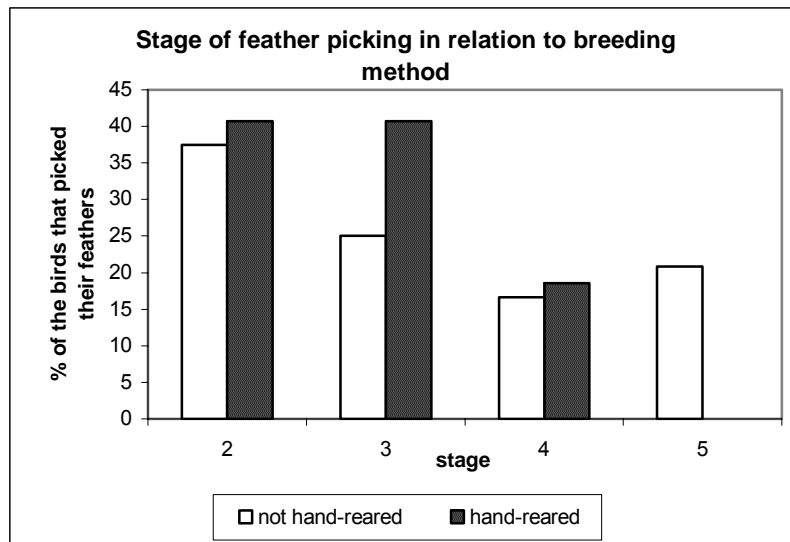


Figure 7-15

Stage 1, which concerns the birds that do not pick their feathers, has not been taken into consideration in figure 7-15. Stage 5 is the worst stage of feather picking and includes the parrots that auto mutilate (see 6.3).

Possible cause for feather picking: in most cases, the original cause could not be ascertained or proved, whereas one or several triggers could often be suspected. A cause was taken into consideration only in obvious cases, when one particular event clearly triggered feather picking. What is striking is that only hand-reared birds seemed to react to "social frustration" by feather picking (certain for 8 parrots), respectively "social frustration" could not be certified in the "not hand-reared" category. This is presumably due to their especially strong bond with human beings and their dependence on a specific person (fig. 7-16).

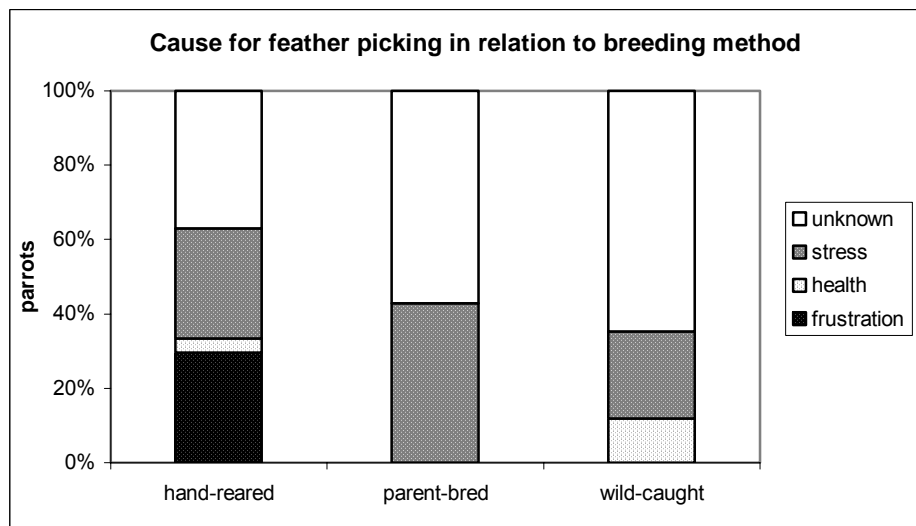


Figure 7-16

Feathers can be plucked, chewed or both plucked and chewed. The hand-reared grey parrots chewed their feathers more than plucked them, whereas the not hand-reared birds usually plucked their feathers, which led to a significant difference between the two groups ($p = 0.007$ FT). Though the method of feather picking was divergent in the two groups, there were apparently other causes apart from the breeding method that drove the parrots to chew or pluck their feathers (see chapter 7.9). As shown in the histogram, exclusively hand-reared parrots both chewed and plucked their feathers.

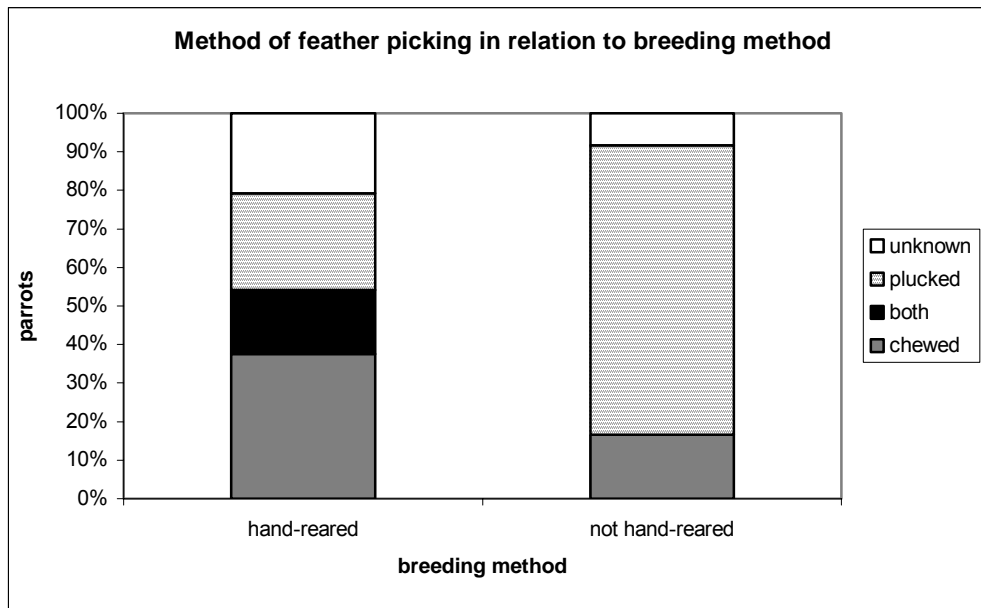


Figure 7-17

Anxiety: the wild-caught parrots kept or developed an abnormal specific fear significantly more often compared with the not imported birds ($p = 0.004$). 46.2% of the wild-caught parrots had developed such anxiety, as against only 23.1% of the parent-bred and 17.5% of the hand-reared birds.

This was probably a consequence of the traumatism related to the capture and importation of those parrots. Some of them reacted to objects that were directly connected with the capture, such as wooden boxes, sticks, carpets or spindly objects (string or even spaghetti). Other fears do not seem to have been directly triggered by importation (such as fears of soft toys, dogs, balloons or specific persons), though the stress endured during importation, adaptation and taming probably set off the inclination to develop anxiety.

Selective behaviour towards human beings: the hand-reared parrots were significantly more selective towards humans (category 4, see chapter 6.3) than the parent-bred and imported birds ($p = 0.008$). The imprinting on humans and the lack of socialization at an early stage in the bird's development enable the parrot to create an especially strong bond with human beings. Consequently, they choose a human partner and consider themselves as being part of a human flock, in which should dwell a hierarchy and specific social interactions between its members (fig. 7-18).

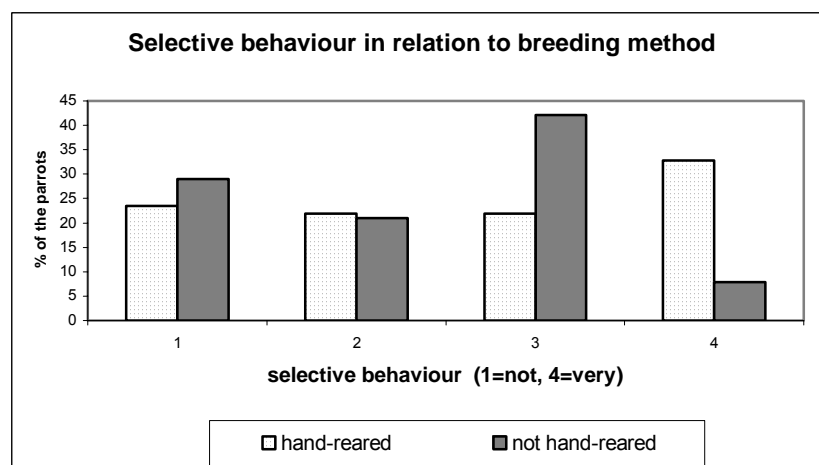


Figure 7-18

Selective behaviour towards men/women: considering aggressiveness towards one sex in particular (human beings), the wild-caught parrots were significantly more selective ($p = 0.00017$). 38.5% of the wild-caught parrots were aggressive towards one sex as against 7.8% of the hand-reared birds. None of the parent-bred parrots displayed such selective behaviour. Another criterion is the preference shown to one sex (without aggressiveness). As regarding this, the percentage of the three groups was very similar (21.9-23.1%).

Compared to the selective behaviour towards human beings, another mechanism is probably at the origin of the aggressiveness towards one particular sex. Grey parrots are somehow able to recognize the sex of a person, according to some owners, sometimes even before the person speaks. The way the African grey parrots discern it remains mysterious.

It was not always easy for the owners (especially the single persons) to answer that question. In many cases, the parrot was not confronted with enough different persons of both sexes to show a preference or aggressiveness towards men or women (and not merely to one particular person). Nevertheless, the imported birds were clearly inclined to develop aggressiveness towards women or men, though they showed a natural respect for human beings and had an almost inexistent tendency to become aggressive. This could be explained by the very bad past experiences of imported birds with some persons (during capture, importation, quarantine or during the first few months of captivity). What also confirms this reflection is that men were probably more involved in the capture and importation than women and the imported birds often preferred women (or rarely developed aggressiveness towards women). 30.8% of the wild-caught parrots were aggressive towards men, as against only 7.7% that developed aggressiveness towards women. This tendency can also be observed in the preference of the birds: 15.4% of the wild-caught parrots preferred women, compared with only 7.7% that preferred men. Unlike the imported parrots, the parent-bred and the hand-raised parrots had about the same disposition to develop aggressiveness (or a preference) for men as for women.

The saying that female parrots prefer men respectively that male parrots prefer women could be ruled out in this study as well (Grzimek in De Grahl, 1991; Lantermann, 1997).

Infantile behaviour: the hand-reared birds begged for food significantly more than the not hand-reared parrots ($p = 0.003$) (fig. 7-19). This expected observation is due to the role of humans as foster parents for hand-reared birds and, as a result, the parrots' imprinting on people. Nevertheless, parrots that have been raised by their parents and that are well socialized do not beg like chicks of other parrots, as this behavioural pattern is infantile and is not displayed anymore once the birds have become adult. The reason why hand-reared birds carry on begging once adult may be that the weaning process in hand-rearing is dissimilar to the natural weaning process and that some important social interactions are most probably lacking to enable the parrots to gain their independence.

Although the owners of the hand-reared parrots gave mouth-to-beak-feedings much more often than those of not hand-reared birds ($p = 0.012$) (mouth-to-beak feeding seems to increase begging), the tendency to beg for food can also be observed in the group of hand-reared birds, that do not get fed that way.

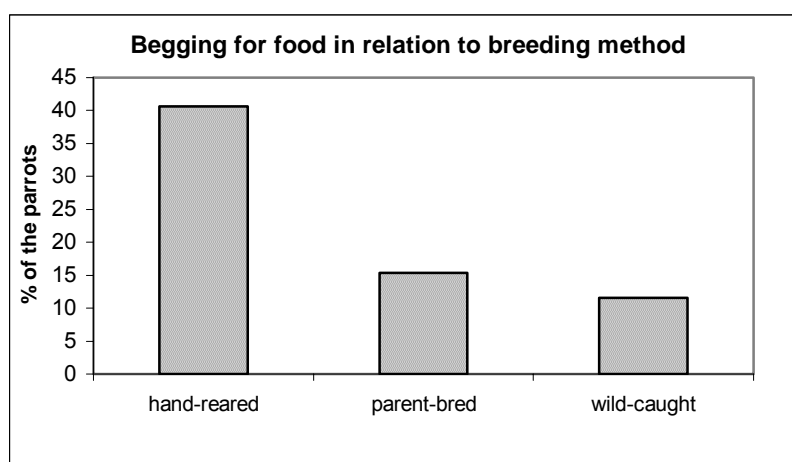


Figure 7-19

Stereotypies: although there is a very similar percentage of birds in every group that have developed stereotypic movements, the birds seem to have acquired slightly different stereotypies according to their breeding method (hand-reared or not).

As previously explained, many owners described repetitive movements of the birds that ended up not being real stereotypies. All the owners' descriptions of the movements were evaluated according to their frequency, their steadiness and their length, to find out if they were real stereotypies or not. For example, many owners saw their birds scratch the bottom of the cage on several occasions, but only a few of the parrots could truly be classified in the group "showing stereotypies".

Among the 15 hand-reared parrots that had stereotyped behaviour,

- 6 birds grasped the wire mesh of their cages with the bill and moved to and fro in a vertical or a horizontal movement either sliding the beak along the wire mesh, the whole body, or their feet.
- 2 birds made typical pirouettes in their cages, standing on a perch, then grasping the wire mesh with their beaks and climbing up in the cage to its roof and hanging down, then eventually reaching out to the perch with their beaks from above and jumping onto it again.
- 2 parrots stood in a specific place and repetitively lifted and vigorously shook their feet always in the same way.
- 2 birds repetitively scratched the bottom of their cages or of another specific place.
- One bird walked to and fro along the perch always in exactly the same manner whilst screeching.
- One bird did a figure of eight with its head.
- One parrot scratched the bottom of its cage and nibbled its claws while sitting always in the same corner of the cage. It took a peculiar posture while doing this, holding its wings away from the rump and staring into space.

The 12 parrots that had not been hand-reared could be classified in the following groups:

- 5 birds repetitively swung their heads or swayed their bodies either sideways or up and down.
- 2 birds did pirouettes in their cages (see above for the description).
- 2 birds grasped the wire mesh with their beaks and moved their bodies up and down.
- 2 birds repetitively walked to and fro along the perch.
- One bird hung upside down on a rope and did a figure of eight with its head.

The main difference between the hand-reared and the not hand-reared parrots that were involved in the study was the frequency of certain movements. 40% of the hand-reared parrots showing stereotypies had developed the same sort of movements, in which the birds hook their bills onto the cages and then slid their whole bodies or parts of them, up and down or from side to side. As for the birds that had not been hand-raised, 42% of them swung their heads or bodies without actually moving their feet. Besides, the hand-reared grey parrots had developed additional sorts of repetitive movements compared to the birds that had not been hand-reared, like scratching the bottom of their cages or lifting and shaking their feet.

Preening: all the parrots, whose plumage was under- or overpreened had been hand-reared ($p = 0.005$ FT). 33.3% of the hand-reared birds (considering only the parrots not picking their feathers) had a dishevelled or ruffled appearance. The evaluation of the birds' plumage is unfortunately rather subjective. A first assessment was made at the owners' while the parrots were being examined. Then, a comparison between all the parrots was made using the pictures that had been taken at the owners'.

Preening is a behavioural pattern that is partly learned through observing other parrots preening. Under- and overpreening cannot clearly be differentiated from one another. Underpreening is probably the consequence of little contact with other parrots during hand-rearing. As for overpreening, it could come from little contact with other birds or might be the beginning of feather chewing, which is often encountered in hand-raised parrots. As parent-bred and imported birds have contact with other parrots at the beginning of their lives and besides tend to pluck their feathers rather than chew them, they usually either preen normally or pluck their feathers, which gives them a distinguishable appearance compared with the hand-reared subjects.

Clumsiness: to the question "do you consider your bird to be clumsy?" significantly more owners (18.8%) of hand-reared parrots answered positively ($p = 0.016$ FT). Only 2.6% of the owners of "not hand-reared" parrots thought their parrots were clumsy. That could be due to the fact that hand-raised parrots usually do not have the opportunity to study adult parrots move or fly around them, and therefore cannot learn by observing them.

Though it would be logical to think that parrots younger than 3 months of age at the time of purchase (all of them having been hand-reared) would be clumsier, the age at the time of purchase does not seem to influence clumsiness.

Health: the not imported birds were significantly in better condition than the imported ones ($p = 0.006$). What can also be seen in table 7-20 is that the parent-bred grey parrots were in the best state of health.

	Breeding method		
	Hand-reared (%)	Parent-bred (%)	Wild-caught (%)
Good health	82.8	92.3	40.0
Satisfactory	12.5	7.7	48.0
Ill	4.7	0.0	12.0
Total	100.0	100.0	100.0

Table 7-20

65.4% of the owners of the imported birds answered "yes" to the question "has your parrot already been ill?" as against 53.8% of the parent-bred and 34.4% of the hand-reared birds, which points out the bad condition of the imported parrots ($p = 0.021$). The rather bad health of the imported parrots could be a sequel to the antibiotic treatment prescribed during quarantine. Besides, even though care apparently did not have any influence on the parrots' health in the study, the slightly worse care (housing and diet for example) of the wild-caught birds probably did affect their health as well.

As regarding the different diseases of the birds according to their breeding methods, there is a disparity concerning respiratory diseases respectively the clinical evidence of respiratory problems found during the observation of the parrots (table 7-21). 57.7% of the imported parrots had already had respiratory problems up till then, as against 30.8% of the parent-bred birds and only 12.5% of the hand-reared parrots. The accumulation of respiratory diseases (especially aspergillosis) of the imported birds can be due to the immunosuppressive effect of the antibiotics used during quarantine.

In table 7-21, the "orthopaedics" group includes broken or dislocated wings or limbs, arthritis, broken beak and flesh wounds.

	Hand-reared birds % (number of birds)	Parent-bred birds % (number of birds)	Wild-caught birds % (number of birds)
Respiratory disease/symptoms	12.5 (8)	30.8 (4)	57.7 (15)
Gastro-intestinal disease	12.5 (8)	0	11.5 (3)
Orthopaedics	15.6 (10)	23.1 (3)	46.2 (12)
Poisoning	6.2 (4)	0	11.5 (3)
Other problems	15.6 (10)	30.8 (4)	76.9 (10)

Table 7-21

Looking at the physical condition of the birds, we could see that 31.2% of the hand-reared parrots were overweight at the time of the visit, as against 23.1% of the imported birds and 15.4% of the parent-bred ones. Most thin parrots belong to the "wild-caught" group, which is probably due to the poor quality of health and the age of the birds belonging to that group (fig. 7-22).

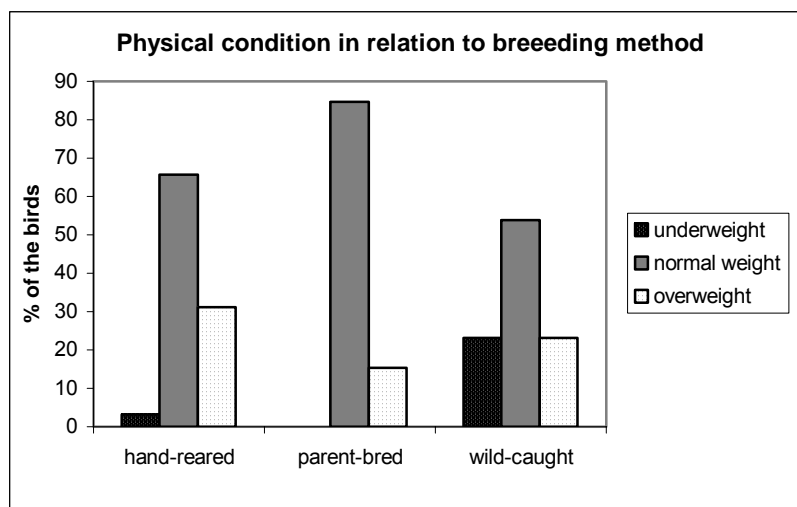


Figure 7-22

The presence of red feathers in parts of the plumage that should be grey, showing nutritional deficiency or metabolic diseases, was significantly more frequently observed in imported birds ($p = 0.006$).

Social contact with other birds during the rearing period: this depended on the age at which the parrots were removed from the nest. The parrots that stayed less than five weeks with their parents were often hand-reared with the whole clutch (80.6%) as against only 54.2% of the parrots that were kept longer in the nest ($p = 0.035$).

Feeding method: there is an obvious relationship between the feeding method and the age at which the chick was removed from its nest. Chicks that are removed from the nest at an early stage are significantly more often fed only with a tube ($p = 0.019$ FT), or initially with the tube and then using a non-invasive method ($p = 0.007$ FT). 81.3% of the chicks belonging to the "tube-feeding" group had stayed less than 5 weeks in the nest, as against 70.0% of the "syringe" category and only 27.3% of the "spoon/pipette" one (fig. 7-25).

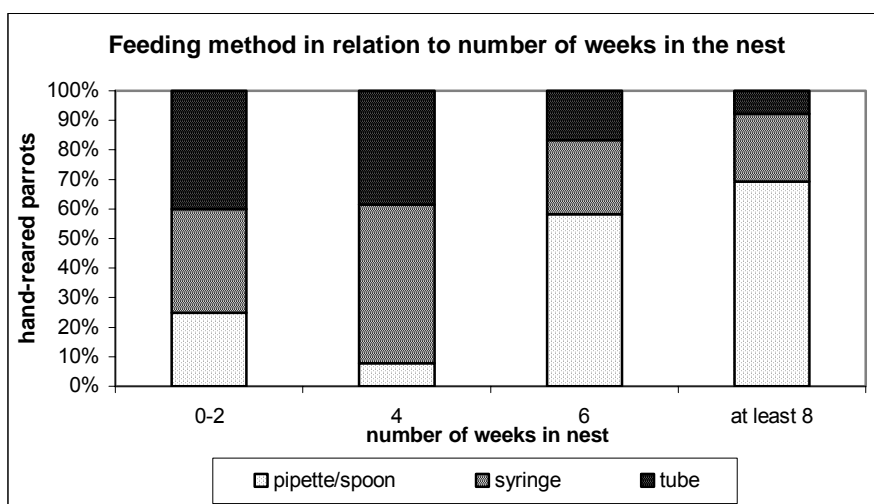


Figure 7-25

Litter: 2.9% of the parrots (=1 bird) belonging to the group "< 5 weeks" had no litter at all in their cages, compared with 30.4% of the birds of the other group. The distribution of birds having substrate or paper in the cage was similar for the two groups.

Exposure to the sun: the category "6 weeks" was especially exposed to the sun daily, i.e. 75% of the birds. 36.4%, 46.2% and 43.2% of the parrots belonging to the groups "0-2 weeks", "4 weeks" and "at least 8 weeks" were daily exposed to the sun.

Diet: as we can see in table 7-26, 50.0% of the parrots belonging to the group "6 weeks" were fed on a very well balanced diet, which is a much higher rate than the other categories. On the other hand, 40.9% resp. 53.8% of the "0-2 weeks" resp. "at least 8 weeks" categories were fed on an inappropriate diet.

Diet	Number of weeks in the nest			
	0-2 weeks	4 weeks	6 weeks	at least 8 weeks
Well balanced	7	4	6	3
Acceptable	6	8	4	3
Inappropriate	9	1	2	7
Total (N° of parrots)	22	13	12	13

Table 7-26

7.3.3 THE INFLUENCE OF THE CHICKS' AGE ON THEIR BEHAVIOUR

Stereotypic movements: the parrots that had been kept less than 5 weeks with their parents tended to develop stereotypies more easily than the ones that stayed for a longer period in the nest ($p = 0.015$ FT). This disclosure confirms what Philbin already brought to light about other animal species, such as monkeys and rats (Philbin, 1998).

We used the classification "< 5 weeks" and ">5 weeks", as the results from the "0-2 weeks" and the "4 weeks" respectively from the "6 weeks" and "at least 8 weeks" groups were very similar and could be put together (fig. 7-30).

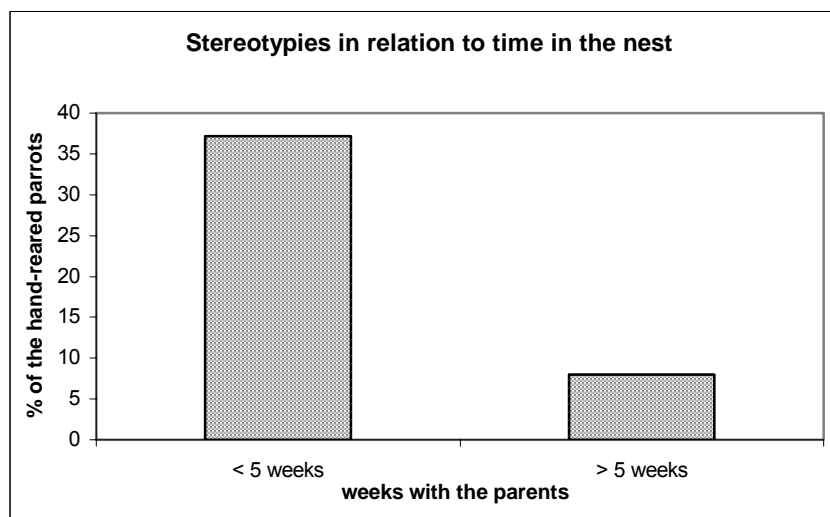


Figure 7-30

Feather picking: looking at the percentages, it is obvious that the birds that stayed 6 weeks in the nest had the tendency to pick their feathers much more than the birds in the other categories (fig. 7-27). That might be because the stress the baby parrots suffered from when they were removed from their parents' nests (although it seemed to last only for about 2 days) coincided with the growth of the bigger feathers. The permanent feathers pin during the fifth to the sixth week of life. The fact that the birds belonging to the group "6 weeks with the parents" tended to be exposed to the sun more frequently than the parrots belonging to the other categories (see 7.3.2) could partially be responsible for their bad quality of plumage.

Besides, most of the birds of the category " ≥ 8 weeks with the parents" had been cured at the time of the visit, hence a very low percentage (only one bird = 8.3%) that picked their feathers in that group. They seemed to be less prone to picking their feathers than any other hand-reared group. Unfortunately, there were not enough birds in each class to allow a statistical analysis of the situation.

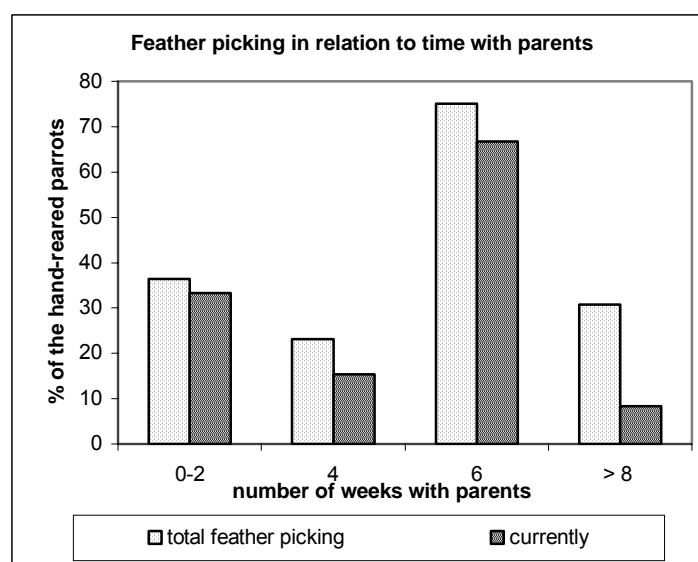


Figure 7-27

The parrots that stayed more than 5 weeks in the nest chewed their feathers rather than plucked them, while the other group tended to pluck them ($p = 0.041$ FT) (fig. 7-28).

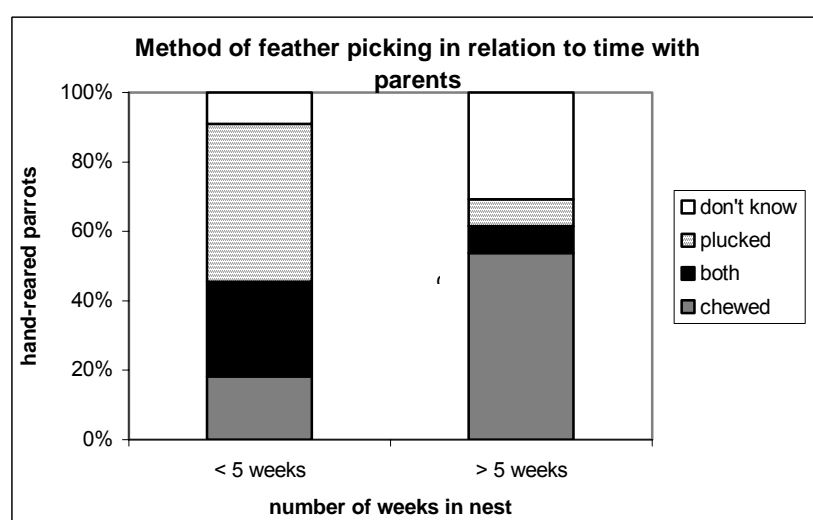


Figure 7-28

Quality of plumage: its quality was very bad in the groups "0-2 weeks" and "6 weeks", as already discussed above. As for the birds that were kept a maximum of 2 weeks with their parents, their bad quality of plumage could be another repercussion of their very strong bond with man and their tendency to develop stereotypic movements. If only the parrots that did not pick their feathers were taken into consideration, there would be about the same proportion of birds that over- or underpreened in every group (table 7-29).

Quality of plumage	Number of weeks in the nest			
	0-2 weeks	4 weeks	6 weeks	at least 8 weeks
Good	36.4 %	53.8 %	16.7 %	61.5 %
Feather picking	36.4 %	15.4 %	75.0 %	23.1 %
Under/overpreening	27.3 %	30.8 %	8.3 %	15.4 %
Total	100.0 %	100.0 %	100.0 %	100.0 %

Table 7-29

Mimicry ability: the parrots that had been kept less than 5 weeks with their parents tended to imitate human words and noises better than those that had stayed longer in the nest (fig. 7-31).

That may be simply due to the fact that the chicks hear human words sooner the earlier they are removed from their parents' nests, as the breeder usually talks to them while feeding them. Nevertheless, the mimicry ability might also be part of the imprinting on humans. That would mean that the bird tries to imitate words in order to become a member of the human flock. Considering this, that would suggest that very young chicks are more likely to bond with humans.

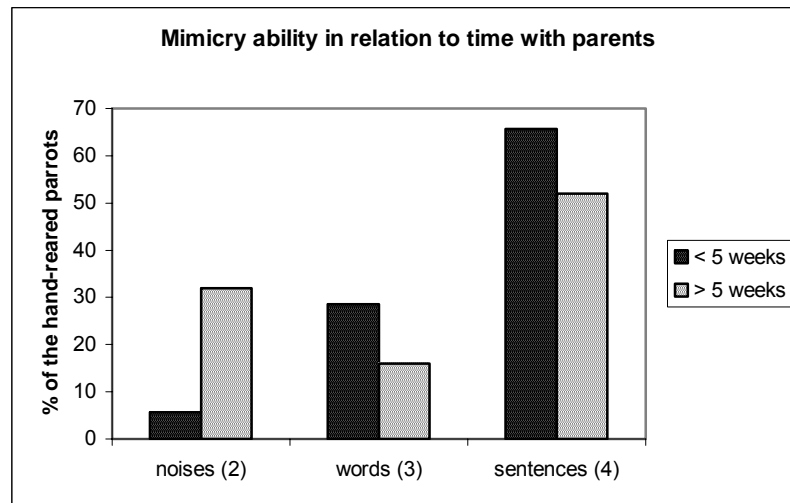


Figure 7-31

Sexuality: the parrots, whose eggs had been artificially incubated were significantly less sexually active than the birds that had been kept for more than 2 weeks with their parents ($p = 0.027$). Only 36.4% of the "0-2 weeks" category showed a sexual activity, as against 69.2%, 58.3% and 69.2% of the "4 weeks", "6 weeks" resp. "at least 8 weeks in the nest" groups.

Normal sexual behaviour with other parrots: if we look at the percentages of the birds having the possibility of displaying such behaviour (i.e. which are kept with other parrots), we can notice again that fewer birds of the group "0-2 weeks" were able to behave sexually normally with another parrot ("0-2 weeks": 33.3%, "4 weeks": 75%, "6 weeks": 57.1% and "at least 8 weeks": 80.0%). Unfortunately, there were not enough birds in each group to allow a statistical analysis.

The observation that chicks which had been removed from the nest before their eyes had opened had more difficulty leading a normal sexual life with other parrots and tended to be sexually inactive in general, is probably the consequence of a very strong bond with humans. Once again, that leads one to think that the chicks which stayed at the most two weeks with their parents are particularly attached to human beings, even if they were kept with other chicks during the hand-rearing period or were directly socialized with other parrots after weaning.

7.4 HAND-REARED BIRDS: FEEDING METHOD

7.4.1 CATEGORIES

The hand-reared parrots have been divided into the following classes:

- 22 parrots had been fed with a spoon or a pipette (those two methods were put together, as they seem to have had a similar effect on the chicks' behaviour).
- 20 had been fed using a syringe.
- 16 had been given food with a tube directly into the crop.
- 2 had been fed using different implements during the nesting period.

4 hand-reared parrots could not be classified, as the feeding method used could not be certified. Many parrots had been fed using different methods according to their age and to the person who was feeding them (owner or breeder). In those cases, only the main method (used most of the time) was taken into consideration.

Another classification was used to point out the effects of exclusive tube-feeding. 11 parrots had been reared exclusively using a tube, compared with 49 birds that had not.

The parrots have also been divided into two other groups: the ones that had been fed using an invasive method (tube or "power"-feeding: food quickly thrust into the chicks' oesophagus, not letting it swallow) (17 birds) and the ones that had never been fed using an invasive method (35 parrots). 12 syringe-fed parrots could not be used in that classification, as it was not clear whether "power"-feeding had been used or not.

7.4.2 DISTRIBUTION OF CONFOUNDERS IN EACH GROUP

Age: as shown in figure 7-32, spoon-fed grey parrots were tendentially older than the birds in the other two categories.

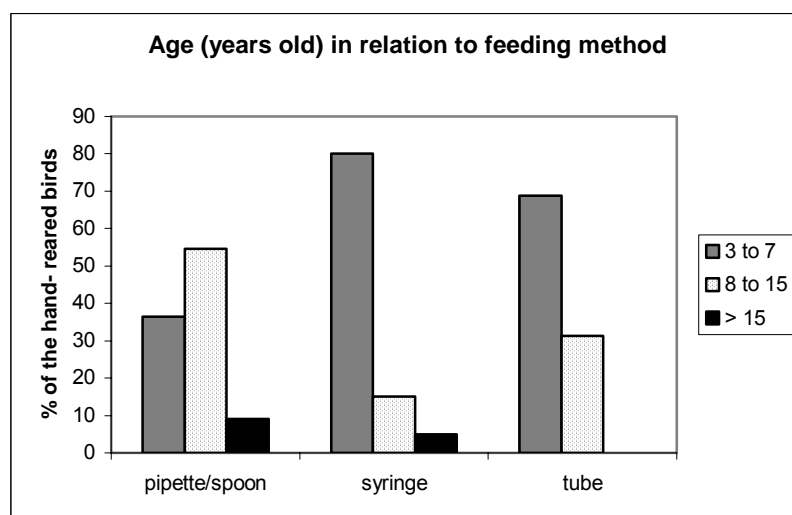


Figure 7-32

Approach to the bird: owners of parrots that had been fed using an invasive method tended to have an inappropriate approach to the bird ($p = 0.015$) (see 6.3). They also reacted to undesirable behaviour significantly more often by covering the birds' cages than owners of the "non-invasive" class ($p = 0.025$ FT).

Social contact with birds during the rearing-period: chicks that had been fed using an invasive method had usually been kept with the whole clutch. Only 13.3% of those parrots had been kept alone, as against 43.8% of the parrots of the other group ($p = 0.052$ FT) (see fig. 7-24).

Contact with human beings during the hand-rearing period: 41.2% of the birds that had been fed using the invasive method had had minimal contact with men during hand-rearing, as against only 17.6% of the birds of the other group. In the same way, 23.5% of the "invasive" category had had a very close contact with the owner during rearing, compared with 55.9% of the birds belonging to the other group ($p = 0.032$) (see fig. 7-24).

Care and housing: the tube-fed parrots were housed in general better than the other hand-reared parrots. They tended to be housed in bigger cages (73.3% compared with 60.0% of the birds fed with a spoon or a syringe) ($p = 0.072$ FT); they less often had standard manufactured perches (37.5% as against 60.3%) ($p = 0.051$) and they often had the possibility of perch outside the cage as well (81.3% as against 47.8%) ($p = 0.043$ FT). Besides, their highest perch was higher (58.8%) compared with those of the other hand-reared parrots (only 28.1%) ($p = 0.036$).

Wing clipping: the parrots that had been fed using an invasive method had already had their wings trimmed significantly more often than the other hand-raised psittacine birds ($p = 0.013$).

Artificial light: as shown in the figure below, most of the spoon-fed parrots' cages were lit up with a normal bulb. The syringe-fed birds more often had true-light lamps and halogen lamps than the other hand-raised parrots (fig. 7-33).

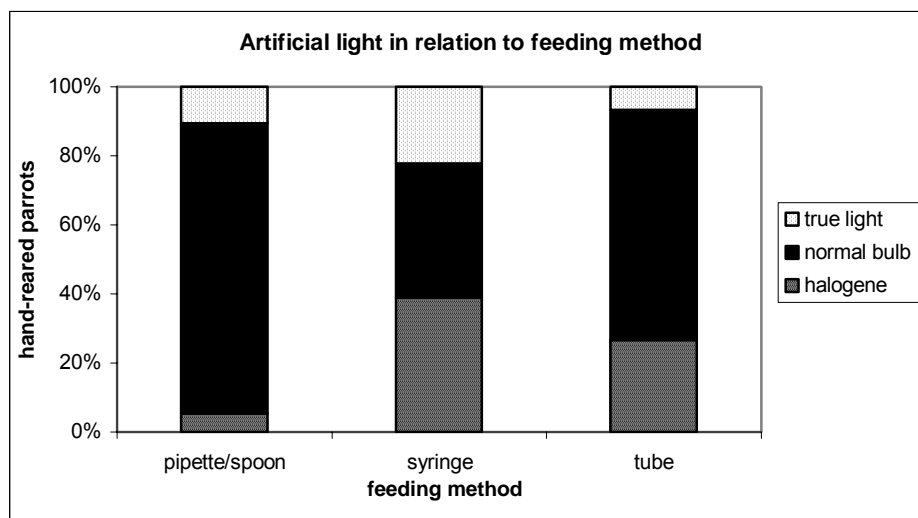


Figure 7-33

7.4.3 THE INFLUENCE OF THE FEEDING METHOD ON THE BIRDS' BEHAVIOUR

Aggressiveness: the parrots that had been fed exclusively with a tube clearly tended to become more aggressive towards humans once adult ($p = 0.104$ FT) (fig. 7-34). Moreover, these birds were significantly more aggressiveness towards the owners than those of the other group.

Flying attacks: 45.5% of the parrots that had been fed exclusively with a tube attacked people by flying at them, as against only 12.2% of the other hand-reared parrots, which leads to a significant difference between the two groups ($p = 0.022$ FT) (fig. 7-34).

Though, so far as we know, this observation had never been made before, it is quite logical to think that parrots that have been fed using a tube, which is most probably uncomfortable or might even be painful for the chicks (if not used properly), could react to it by developing aggressiveness towards human beings. That means that tube-feeding certainly generates stress to the bird and should be set aside for medical treatment only and for birds that cannot be fed using other more natural methods.

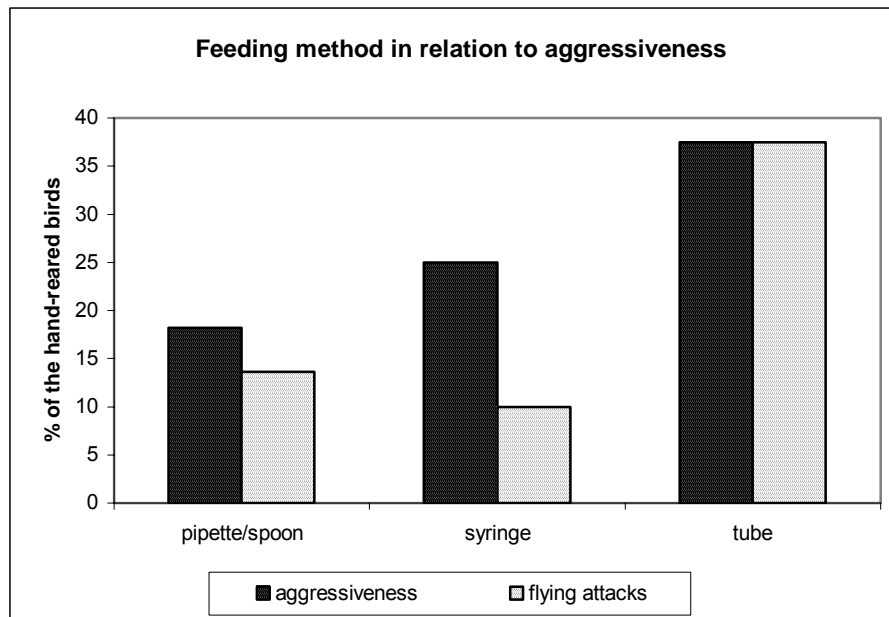


Figure 7-34

Aggressiveness towards toys: the parrots that had been fed with a spoon or a pipette tended to develop aggressiveness towards a specific object or a toy more easily than the other hand-reared parrots. 54.5% of the "spoon/pipette" group had developed aggressiveness towards specific objects, compared with 20.0% of the "syringe" and 25.0% of the "tube" category ($p = 0.012$). The parrots that had been weaned at the owners' homes were inclined to develop aggressiveness towards objects as well. As most of the parrots that had been weaned at the owners' had also been fed using a spoon ($p = 0.091$), it is very difficult to tell which factor originally triggered that type of aggressiveness (see 7.8.2). It might be because it takes more time and it is more difficult to feed a chick with a spoon. If not used correctly (owners are usually not used to hand-rearing chicks), this feeding method may annoy and distress the bird and therefore trigger a reaction to other objects in its environment once adult.

Screeching: the grey parrots that had been fed using an invasive method had developed this problem significantly more than the parrots that had been fed with a spoon or syringe ($p = 0.031$ FT). That is probably a response to the stress endured by those parrots during the hand-rearing period.

Behaviour at the time of purchase: according to the owners, only 9.1% of the parrots that had been fed with a spoon or a pipette had been fearful or very shy at the time of purchase, as against 30.0% of the babies fed with the syringe and 25.0% of the chicks fed with a tube ($p = 0.108$ FT).

It looks as though neither the "age at the time of purchase" (chick weaned or not) nor any other confounders had influenced the birds' behaviour at the time of purchase. That leads one to think that

spoon-feeding is the least stressful hand-feeding method. Spoon-feeding is also very time consuming, and the relationship with the chick is therefore logically closer.

Health: the health of the parrots that had been fed using an invasive method was significantly worse than that of the birds that had been fed with a spoon or syringe ($p = 0.027$ FT). Besides, they had been to the vet more frequently than the other category of birds (only 5.9% of those parrots had never been to the vet, as against 22.9% of the birds belonging to the "non-invasive" group).

There might be several reasons for the bad health of the chicks that had been fed using an invasive method. First of all, their bad health could be explained by the stress which that group of hand-reared parrots undergoes and which presumably affects the chicks' immune systems. Besides, tubes are also very difficult to maintain in an irreproachable hygienic condition, as they are very difficult to clean (Reinschmidt, 2000), which could be responsible for their poor health (fig. 7-35).

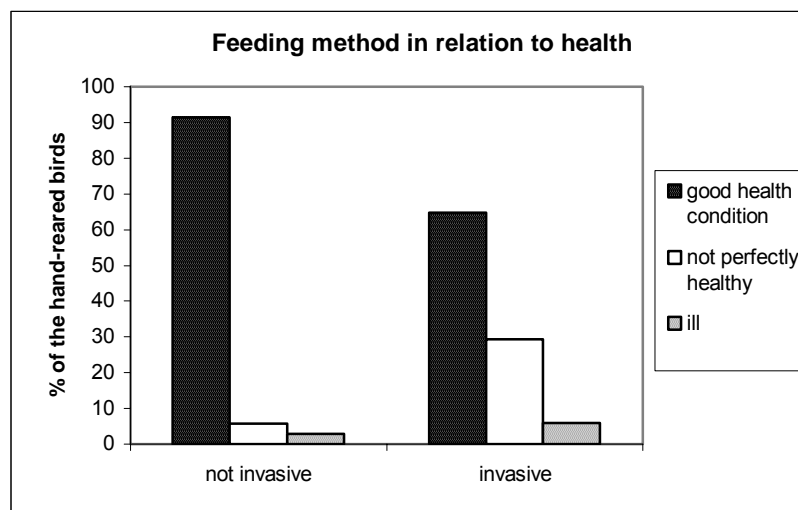


Figure 7-35

7.5 HAND-REARED BIRDS: SOCIAL CONTACT WITH THE CLUTCH DURING THE UPBRINGING

7.5.1 CATEGORIES

The hand-raised parrots have been divided into two groups, according to their contact with other parrots during most of the hand-rearing period (calculated as from the removal from the nest to the 13th week of life).

- 38 parrots had stayed with the clutch during the whole hand-rearing period or most of it.
- 17 birds had been housed mainly alone until weaning.

4 birds had been with other chicks for about half of this period and then hand-raised alone, and one bird was first alone and then with other chicks. The two last categories could not be used for the statistics, because they concern a very small number of birds. Besides, the social contact during rearing of 4 hand-reared parrots could not be attested.

7.5.2 THE INFLUENCE OF THE SOCIAL CONTACT WITH THE CLUTCH ON BEHAVIOUR

For this criterion and the following ones that concern hand-rearing methods (up to chapter 7.9), no confounders have been noted down, in order to shorten the text and make it clear. Nevertheless, all confounders have been taken into consideration in the evaluation of the results.

Infantile behaviour: the parrots that had been raised isolated from other chicks tended to beg more once adult compared with the birds that had been raised with the clutch ($p = 0.087$).

Normal sexual activity with parrots: few of the birds could be considered for that criterion, as the birds that did not have the opportunity to fulfil a bond with parrots (i.e. that were kept alone) could not be taken into consideration. In spite of that, a slight influence on the birds' sexual behaviour could be noted ($p = 0.175$ FT): 68.4% of the birds that had been raised with the clutch were able to have a normal sexual activity with another parrot, as against 33.3% of the birds of the other category.

Selective behaviour towards human beings: the parrots that had had little or no contact at all with other birds during the nesting time became more selective and usually accepted physical contact only from one particular human being. In figure 7-36, the categories "1" and "2" have been grouped. As previously explained, "1" is the "least selective" category and "4" concerns the most selective and exclusive birds (see 6.3).

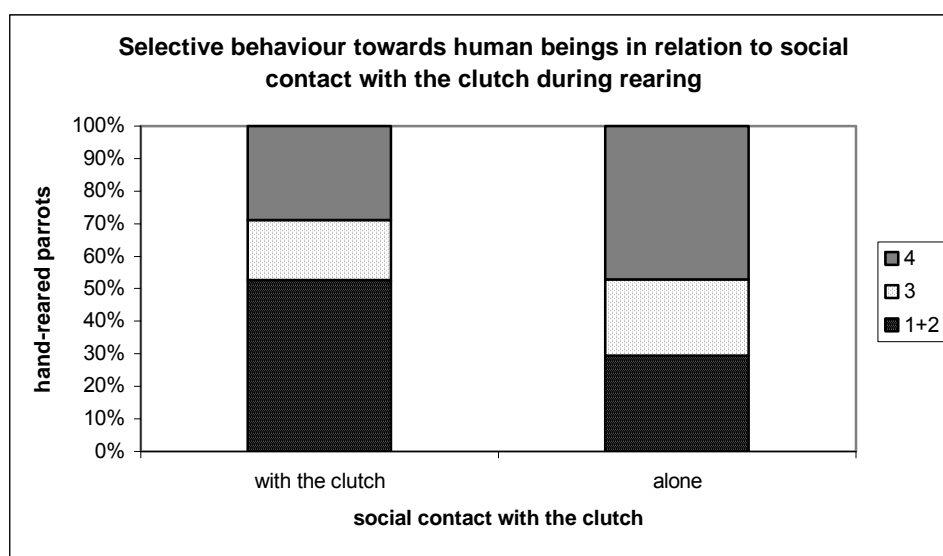


Figure 7-36

Selective behaviour towards one particular sex: the parrots that were kept with the clutch during the nesting period developed a preference for women or men more easily (34.3%) than the birds that were raised alone (6.7%) ($p = 0.075$ FT). As for aggressiveness towards one particular sex, both groups had a similar tendency (about 10% displayed aggressiveness towards one sex).

The effects of social contact with parrots during hand-rearing on behaviour all depend on the intensity of the bond with humans. Parrots that had had little contact with human beings during their upbringing developed a stronger bond with humans and were less capable of achieving a normal relationship with another parrot. Those parrots begged more for food, did not display a normal sexual activity with another parrot, were more selective in general and showed a preference for one particular sex more easily (probably following a similar mechanism to selective behaviour in general, contrary to aggressiveness towards men or women).

7.6 HAND-REARED BIRDS: SOCIAL CONTACT WITH THE CLUTCH DURING THE WEANING STAGE

7.6.1 CATEGORIES

The hand-raised birds have been classified into three groups, according to the parrots' social contact during the weaning stage:

- 32 hand-reared parrots were kept with other birds during the weaning stage.
- 22 were kept isolated from other parrots during that period.
- 7 were housed separately, although they had a visual contact with other parrots.

3 hand-raised parrots could not be used for that criterion.

7.6.2 THE INFLUENCE OF THE SOCIAL CONTACT WITH THE CLUTCH ON BEHAVIOUR

Docility: as shown in figure 7-37, the parrots belonging to the group "alone" tended to be more docile with their owners. On the other hand, they behaved less docilely with strangers (fig. 7-38). Unfortunately, there were not enough subjects in each class to allow a statistical analysis of the situation.

Group 1: the least docile (categories 1 and 2 have been grouped) and group 4: the most docile (see 6.3).

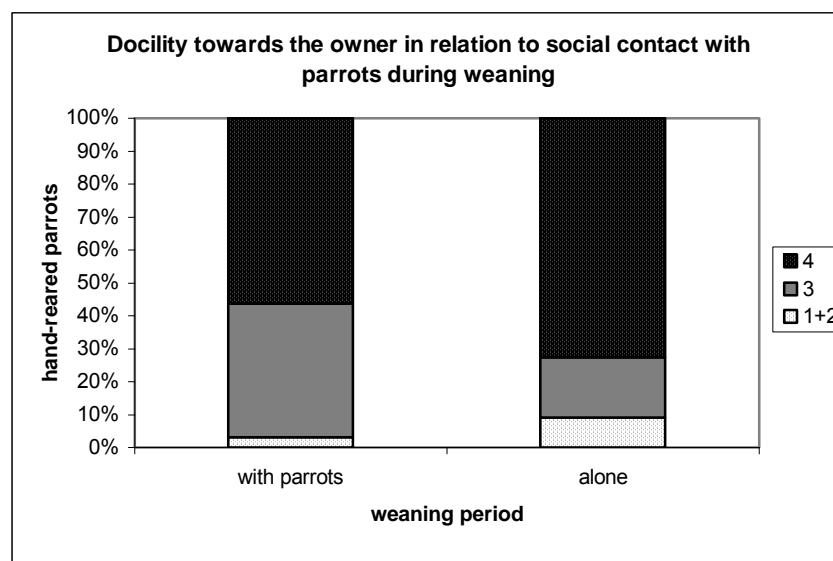


Figure 7-37

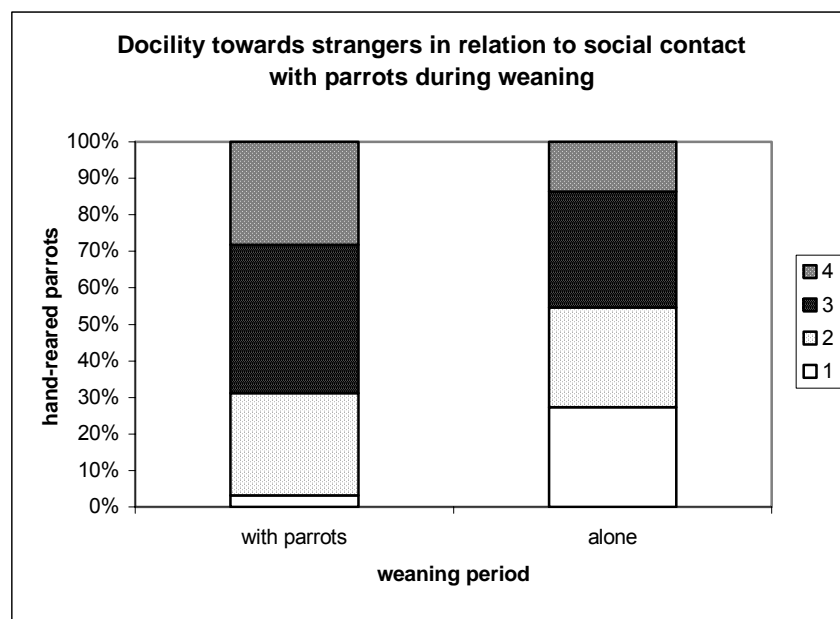


Figure 7-38

Those results are again associated with the bond with human beings. African grey parrots probably learn how to socialize normally during that period of their development. Again, the parrots that had been alone during weaning had tended to create a very strong bond with a person and were very docile with that chosen partner. Conversely, those birds were less docile with strangers. The fact that the birds which had had a contact with other parrots during the weaning period were more docile with strangers demonstrates their greater flexibility concerning their partner and their looser bond with one particular person.

7.7 HAND-REARED BIRDS: CONTACT WITH HUMAN BEINGS DURING REARING

7.7.1 CATEGORIES

The hand-reared parrots have been divided into three groups. We could not determine the way 4 subjects had been hand-raised, and therefore did not take them into consideration.

- *No contact*: this category concerns chicks that had been reared in a room which was not inhabited. The breeders had come in only to feed the birds and had had minimal contact with them. 14 parrots belong to this group.
- *Intensive breeder*: the birds had stayed in an inhabited room of the house with constant contact with the breeders. Besides, the breeders had taken time to talk to the birds and to handle them. 22 parrots belong to this category. This group also includes the parrots that had been hand-raised at the owners' homes with little contact with them.
- *Intensive owner*: the chicks had been hand-raised at the owners' during most of the hand-rearing period. The birds had been kept in an inhabited room, with sustained contact and a very close relationship with the owners. 23 birds had been hand-raised that way.

7.7.2 THE INFLUENCE OF THE CONTACT WITH HUMAN BEINGS DURING REARING ON BEHAVIOUR

Territorial behaviour: all the parrots that had developed territorial behaviour had been hand-raised at a breeder's. Most of them belong to the group "intensive breeder" ($p = 0.021$ FT). That could be due to the fact that those parrots are usually kept in cages during the weaning period, unlike the parrots that are hand-reared at the owners' homes and which are most of the time free several hours a day. Besides, there are other birds in the same room or even in the same cage at the aviculturist's and the need to defend their territory is undoubtedly more important for those parrots.

Ability to lead a normal sexual life with another parrot: only the parrots that were kept with another psittacine bird were considered in this analysis. The parrots that had been raised with minimal contact with humans tended to have normal sexual behaviour with other parrots more easily than parrots that were hand-raised at the owners' ($p = 0.069$ FT). The trend is quite clear, though the result is not significant (probably because of the small number of birds) (fig. 7-39).

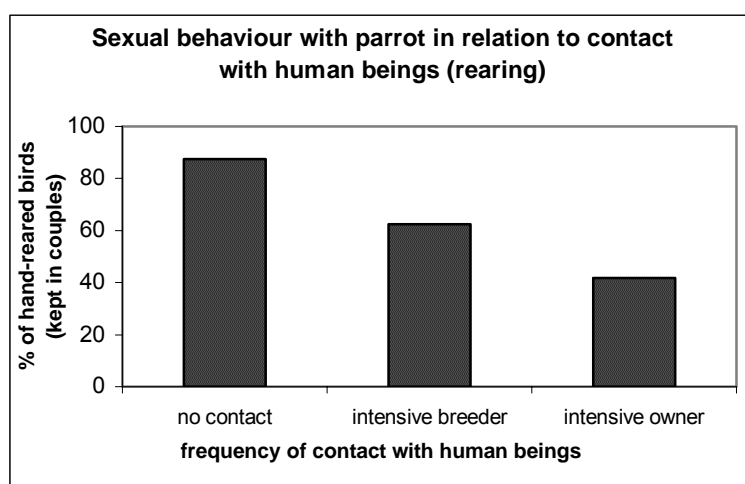


Figure 7-39

Partner: if we consider only the birds that were kept with another grey parrot and therefore really had the opportunity to choose their partner (all the birds of the study that were kept alone had a bond with humans), we can clearly see that the closer the relationship during the hand-rearing period the more likely the parrot is to select a human being as its partner (fig. 7-40).

Parrots that are kept with another grey parrot:

Partner	Frequency of contact with human beings during hand-rearing % (number of birds)		
	None	Intensive owner	Intensive breeder
Parrots	87.5 (7)	44.4 (4)	66.7 (4)
Humans	12.5 (1)	55.6 (5)	33.3 (2)
Total	100.0 (8)	100.0 (9)	100.0 (6)

Figure 7-40

The main effects of the frequency and intensity of the contact with people during the hand-rearing period were again related to the bond with human beings. The parrots that had had minimal contact with people during hand-rearing were able to have a normal sexual life with other parrots and choose birds rather than people as partners.

Though the contact with other chicks during the nesting-time also has an influence on the sexuality of mature birds (see 7.5.2), it is impossible in this study to determine which factor (contact with the clutch or frequency of contact with humans) had had the greater influence on their sexuality. The main

problems were the small number of birds available and the fact that all the chicks that had been hand-reared separated from the clutch had also been raised at the owners'.

7.8 HAND-REARED BIRDS: THE WEANING PERIOD

7.8.1 CATEGORIES

The hand-reared parrots have been separated into two groups. On the one hand the birds that were weaned at the breeders' and on the other hand those which were sold to the owners before they had gained their independence.

- 30 hand-reared birds had been sold before being independent and therefore had been weaned at the owners'.
- 29 parrots had been weaned at the breeders'.

1 bird had been weaned in a pet shop and the situation was unknown in 4 other cases. Those parrots could not be used for the statistics.

7.8.2 THE INFLUENCE OF THE WEANING PERIOD ON BEHAVIOUR

Aggressiveness towards objects: the chicks that had been sold before weaning were significantly more aggressive towards one particular object (50.0%) compared with the parrots that had been sold once fully weaned (24.1%) ($p = 0.040$). As the chicks that had been weaned at the owners' had usually been fed with a spoon, this result is probably simultaneously influenced by spoon-feeding (see 7.4.3).

Feather picking: the parrots that stayed longer at the breeders' picked their feathers at the time of the visit significantly more than the parrots that had been sold before weaning ($p = 0.024$). In spite of that, if we have a look at figure 7-41, it is obvious that the parrots showing that behavioural problem less often ("sold before weaning"), had their plumage in a much worse state when they actually did pick their feathers. The fact that the parrots which had been weaned at the breeders' tended to pick their feathers more could be due to greater stress (more animals around, possibly stressful handling) endured at the breeders'. On the other hand, the parrots that had been sold before weaning tended to under- or overpreen their plumage, which actually led to a similar percentage of birds in both groups that had their plumage in good condition ($p = 0.011$) (fig. 7-41).

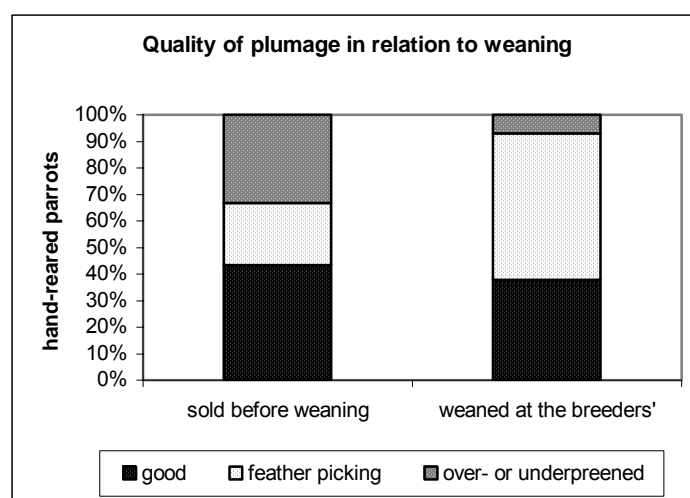


Figure 7-41

Group 1 has been removed, as it concerns the birds that did not pick their feathers. Categories 4 and 5 have been grouped and contain the birds with the worst condition of plumage. A statistical analysis could not be carried out, as there were not enough birds in every group (fig. 7-42).

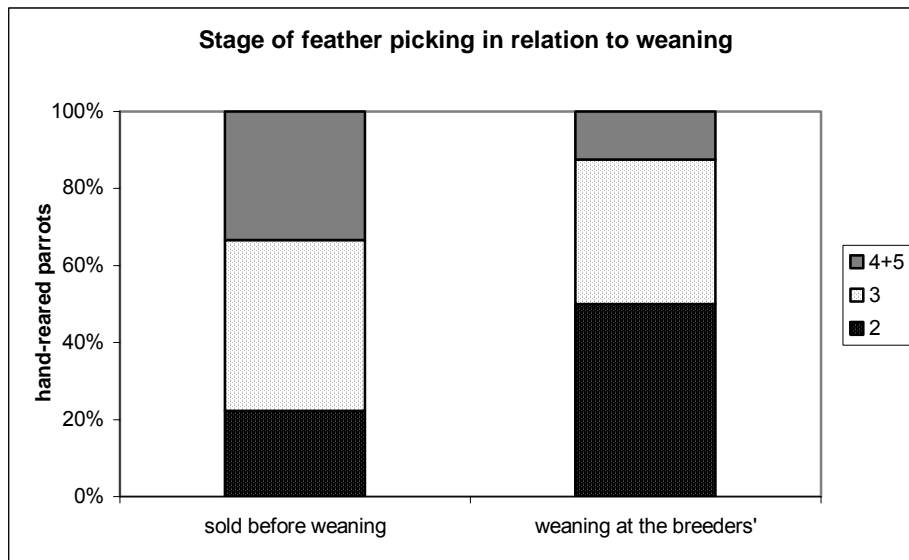


Figure 7-42

Weaning: all the chicks (5 birds) that needed an excessively long time before being fully independent belong to the category "weaned at the owners". That is probably partly due to the fact that the owners usually enjoy feeding the chicks and are willing to carry on hand-raising longer than the breeders.

7.9 CARE AND HOUSING: THEIR INFLUENCE ON THE PARROTS' BEHAVIOUR

7.9.1 HOUSING

Many criteria concerning housing were significantly linked. Therefore, it was not always obvious which criterion had originally influenced the behaviour. Figure 7-43 provides an overview of these connections:

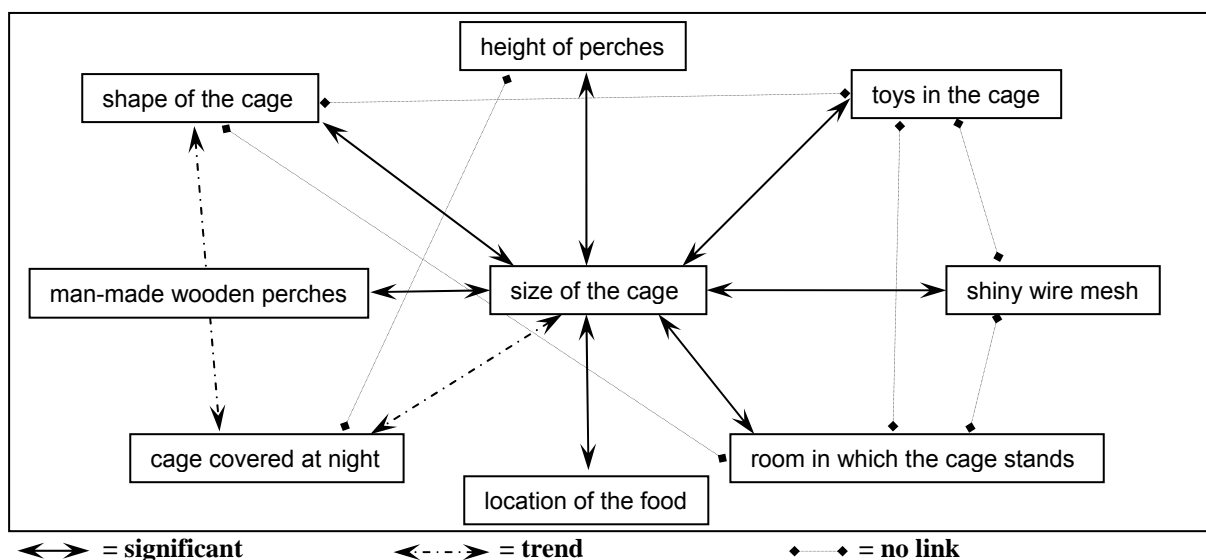


Figure 7-43

In order to clarify the diagram, only the relationships with "the size of the cage", as well as every trend, are represented in it. Nevertheless, there are significant links between all the criteria of the chart (except between the ones marked with diamond-ended arrows $\blacklozenge\blacklozenge$).

The size of the cage: the parrots that were housed in "small cages" (max. 80x120x100 cm) developed significantly more stereotypies than those kept in aviaries ($p = 0.011$). Besides, they were inclined to be sexually active with human beings ($p = 0.002$) (fig. 7-44).

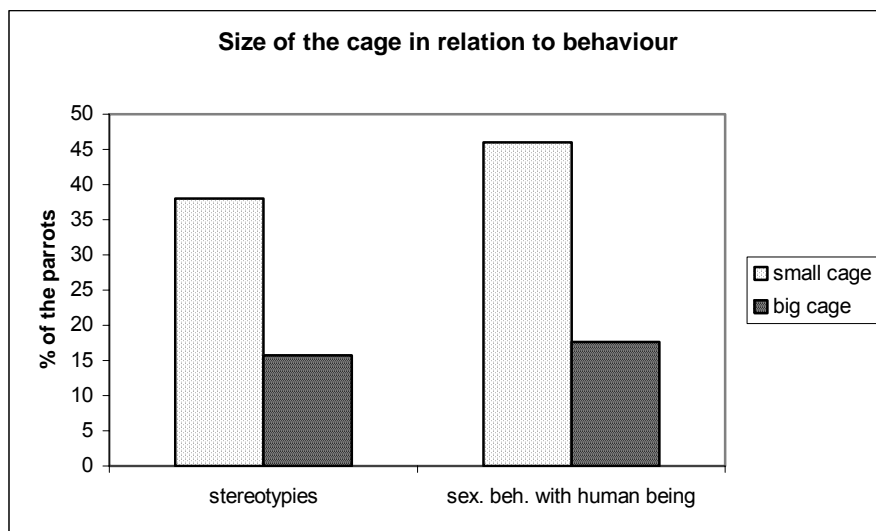


Figure 7-44

Wire Mesh: shiny wire mesh seems to have a positive effect on the sexuality of grey parrots. Parrots housed in such a cage were significantly more sexually active with humans ($p = 0.0034$) compared to birds that were kept in matt cages. Accordingly, the former birds tended to be more active sexually in general as well ($p = 0.105$).

Paper as litter: many owners put paper at the bottom of the parrots' cages and changed it every day or a few times a week. Using that substrate seemed to lead to aggressiveness and flying attacks ($p = 0.011$ FT). Those parrots also seemed to develop anxiety significantly more easily ($p = 0.002$). Besides, the parrots that had paper as litter in their cages tended to have a sexually active type of behaviour with the owner ($p = 0.016$).

Those reactions are probably due to the fact that the owner enters the territory of his/her parrot very frequently to change the paper. That might be interpreted as intrusion by the parrot, which reacts either with aggressiveness and tries to defend its territory, or with fear and develops a feeling of insecurity.

No litter: the parrots that had absolutely no litter and therefore had nothing to nibble at the bottom of their cages showed some behavioural problems, such as feather picking ($p = 0.087$), screeching ($p = 0.042$ FT) and anxiety ($p = 0.005$) more often than the birds with substrate in their cages.

Substrate or paper can be a source of occupation for the birds that often play with it, chew or eat it. The parrots that do not have the opportunity to keep busy destroying their substrate can logically develop behavioural problems related to boredom, such as feather picking or screeching. Besides, owners that do not put litter in the birds' cages usually need to wipe them every day. That might be stressful, and lead the parrots to develop anxiety (fig. 7-45).

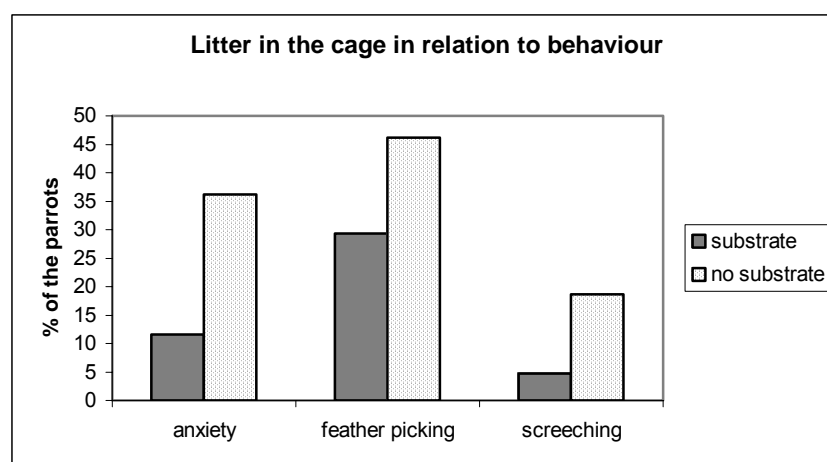


Figure 7-45

Cage located next to a window: the parrots that were kept in cages placed next to a window picked their feathers significantly more than the birds that were kept in cages which stood by a wall or in a corner ($p = 0.023$). Besides, the former birds were prone to scream more than the other parrots ($p = 0.089$ FT).

This influence could be due to the fact that African grey parrots, being very shy birds, may be stressed and burdened by all the bustle and animation that they see through the window. As most parrots do not have a shelter at their disposal in their cage, they cannot find a peaceful place to hide and react to that stress by picking their feathers and screeching (fig. 7-46). Nevertheless, this might be a very good source of occupation for less sensitive parrots.

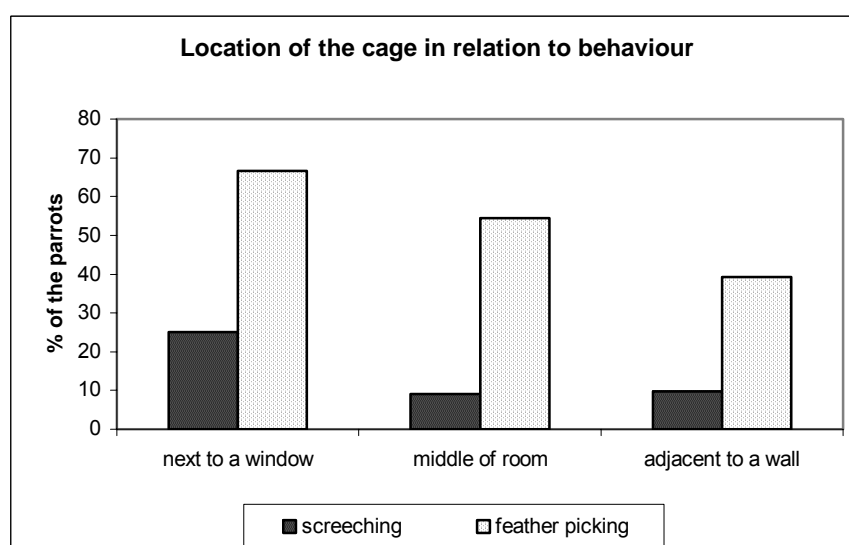


Figure 7-46

The location of the cage also seems to stimulate sexuality. The birds whose cages were placed adjacent to a window tended to be sexually active in general (with a parrot or with humans) ($p = 0.038$) and displayed significantly more often sexual behaviour with the owners ($p = 0.009$). They also regurgitated significantly more often than the birds belonging to the other categories ($p = 0.019$ FT).

Perches: standard manufactured perches favoured the development of stereotypic movements ($p = 0.018$). This factor seemed to trigger stereotypic behaviour independently of the size of the cage (both criteria are linked).

Perch outside the cage: the grey parrots taking part in the study that had portable perches outside their cages were inclined to screech more than the birds that did not have any opportunity to perch outside the cages ($p = 0.074$ FT). That reaction could be due to the fact that birds that are locked in and know that there are perches outside their cages want to perch on them and consequently screech, either to draw the owners' attention to make them open their cages, or merely to show their frustration.

Height of the highest perch: the parrots whose highest perch was placed lower than eye level had developed significantly more often anxiety than the birds with higher perches ($p = 0.008$ FT). This observation probably indicates that a high perch helps them feel secure. Apart from that fact, its height did not seem to have any influence on the aggressive or dominant behaviour of the birds, as stated by many authors and behavioural consultants (Kaleta, 2003; Low, 2001; Athan, 1999).

Toys in the cage: the parrots that did not have toys in their cages were significantly more inactive sexually ($p = 0.026$) than the birds that had many toys to play with. Besides, they were also inclined to screech more ($p = 0.102$ FT) and to develop stereotypies ($p = 0.062$ FT). Those results are all connected with the lack of occupation of such parrots. Parrots that have no toys to play with tend to develop problems related to boredom, such as stereotypies, screeching and sexual inactivity (fig.7-47).

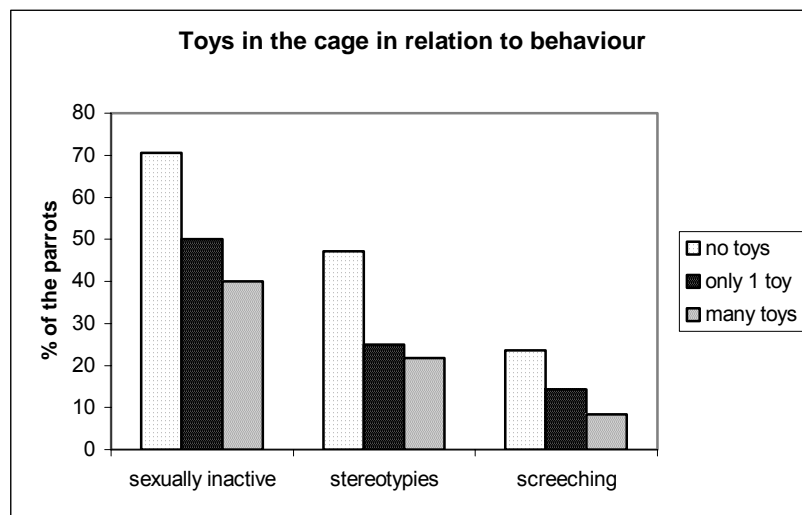


Figure 7-47

Toys outside the cage: the parrots that had no toys outside their cages developed significantly more stereotypies than the parrots that had toys at their disposal ($p = 0.035$). That is probably due to many phenomena. First, birds that have toys outside their cages are more active and are kept busy when they are free. Secondly, it also means that they are sometimes out of their cages. Finally, parrots that have toys out of their cages usually have toys inside as well and are well occupied. None of those explanations was solely responsible for that observation, though all those criteria probably helped reduce stereotypic behaviour.

On the other hand, the parrots that had many toys outside their cages developed nervous repetitive habits significantly more easily ($p = 0.0068$). 32.4% of the parrots with many toys outside their cages had developed such "tics", as against 10.0% of the birds that had only one or no toy at all outside their cages.

Room in which the cage stands: the parrots that lived in a room which was inhabited were prone to acquire stereotypies significantly more ($p = 0.010$ FT) and screeched more frequently ($p = 0.030$ FT) than the parrots belonging to the other category. That means that parrots that are kept in a place where there is a lot of human activity might interpret it as stress, which could enhance the development of stereotypic behaviour and screeching. It could also drive the bird to try and get the owner's attention and feel frustrated about having its "partner" in the same room as itself without being able to go to

him/her. That frustration might be expressed in screeching and stereotypies. Those parrots also regurgitated much more often than the ones that lived in a place with very little contact with human beings ($p = 0.013$).

Cage covered at night: many owners cover their parrots' cages for the night. In the group of grey parrots that have been studied, this habit clearly increased the development of anxiety ($p = 0.0017$). 44.1% of the parrots that had their cages covered at night got that problem, as against only 15.7% of the birds, whose cages were not covered at night. Besides, for birds that picked their feathers, that practice led significantly more to feather plucking rather than chewing ($p = 0.038$ FT). The birds whose cages were covered every night also seemed to develop stereotypies more easily ($p = 0.019$).

Note: in short, what we can see is that stereotypies can be triggered by small cages and little occupation, which confirms many other studies (Philbin, 1998, Garner *et al.*, 2002, Wemelsfelder, 1994, Jupprien, 1996). Besides, stress, such as having a covered cage at night or being forced to live in an inhabited room with much human activity, also seems to contribute to the development of stereotypic movements.

7.9.2 CLIMATE, ENVIRONMENT

Humidity: in an environment with a low level of humidity, 61.5% of the parrots that picked their feathers chewed them rather than plucked them. When the humidity rate was high enough, 26.9% of the parrots that picked their feathers chewed them ($p = 0.036$). In a very humid environment (more than 60%), fewer birds picked their feathers than in a dry one ($p = 0.006$ FT), which confirms the importance of a high level of humidity for the bird's plumage and for normal preening. Nevertheless, this tendency could not be observed for lower humidity rates: there was no significant difference between the "45-60%" and the "<45%" groups, as far as that problem is concerned.

Bathing: the birds that picked their feathers and very seldom (less than once every second week) or never had the opportunity to bathe (or to get sprayed) chewed their feathers significantly more than plucked them ($p = 0.027$ FT). Besides, the hand-reared grey parrots over- or underpreened more when they did not have enough opportunities to bathe ($p = 0.001$ FT). In this respect, over- or underpreening can be considered as being a very early stage or a forewarning of feather picking (fig. 7-48).

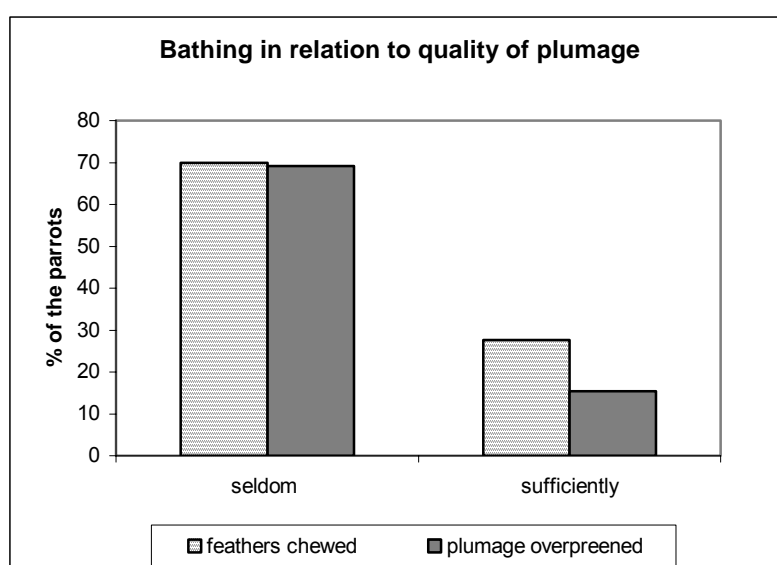


Figure 7-48

Light: only 22.2% of the birds that were kept in a "dark" place were sexually active, as against 50.7% of the birds in the "bright" category and 69.6% of the parrots in the "very bright" class ($p = 0.022$ FT), which shows the importance of light for the endocrine system, which among other things rules the sexual behaviour of birds.

Length of daylight: most of the aggressive parrots belonged to the category "too short" or "too long". The parrots that had about 12 hours' rest a day developed aggressiveness significantly less easily ($p = 0.033$ FT). The hand-reared birds that had an inappropriate night-day ratio tended to over- or underpreen their plumage. 66.7% of the parrots belonging to the group "too short" and that did not pick their feathers over- or underpreened, compared with 37.5% of the parrots of the category "long" and only 17.6% of the birds that had about 12 hours' rest a day.

Exposure to the sun: the birds that picked their feathers and were exposed to the sun daily (some of them without any possibility to go into the shade) chewed their feathers significantly more than plucked them ($p = 0.049$ FT). Hand-reared parrots that were exposed to the sun daily had a slight tendency to over- or underpreen their plumage ($p = 0.109$), which again could be interpreted as the beginning of feather picking. That is probably partly due to the drying effect of the sun-rays and to the fact that grey parrots live under the tree canopy in the wild and are usually only exposed to the sun when flying above the trees.

7.9.3 STIMULI IN THE ENVIRONMENT

Stimulation: the hand-reared parrots seemed to react with aggressiveness to a lack of stimulation in their environments ($p = 0.020$ FT). The imported and parent-bred parrots did not look as though they were influenced by such things. Besides, as very few "not hand-reared" subjects were aggressive, the trend in that group could not be detected.

Changes in the cage: the owners that never changed the position of the perches or games in the parrots' cages contributed to the development of anxiety ($p = 0.00016$ FT) (fig. 7-49).

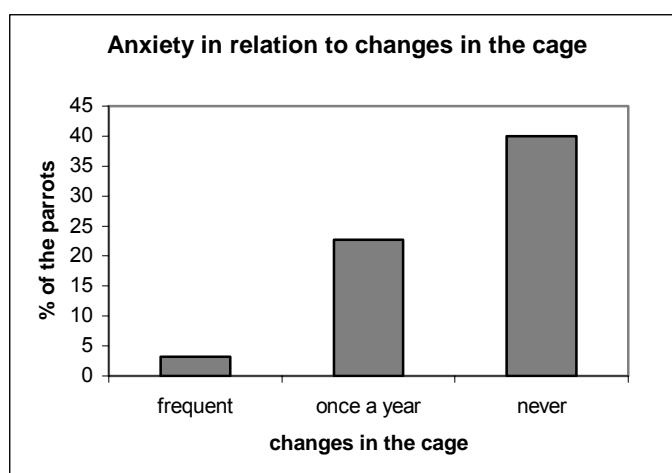


Figure 7-49

Cage moved outside daily: the parrots whose cages were moved outside or onto the balcony daily seemed to be sexually more active in general ($p = 0.044$) or with humans ($p = 0.065$). By analogy with the results related to the location of the cage, it looks as though the birds that were confronted with the weather and the outdoor environment were sexually more active than the parrots which had always been kept indoors (fig. 7-50).

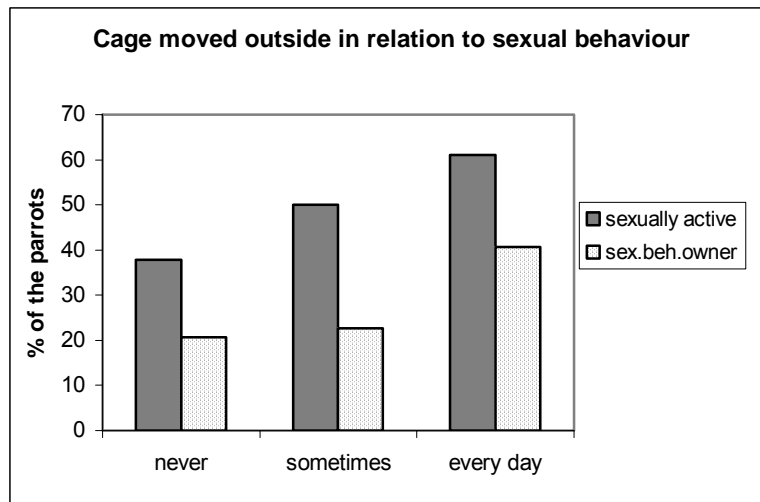


Figure 7-50

7.9.4 FLYING ABILITY, FREEDOM

Primary feathers trimmed: the parent-bred and wild-caught parrots which had already had their wings clipped, showed repetitive habits significantly more than the parrots that could fly ($p = 0.010$ FT).

Flying away is the most natural reaction of a parrot that is frightened. As imported and parent-reared birds are not tame from the beginning and keep their natural fear of human beings, it must be very stressful for them not to be able to flee or to avoid contact with humans by flying. Therefore, those birds could acquire nervous repetitive habits as a reaction to that stress. Besides, what certainly contributes to the development of such habits is the frustration of not being able to fly, which is a natural need for birds. Looking at hand-reared and not hand-reared birds, we could see this tendency in both cases, although it was much more prominent in wild-caught and parent-bred birds.

Freedom: the hand-reared parrots that were seldom let out of their cages over- or underpreened their plumage significantly more than the birds that were free on a daily basis ($p = 0.017$ FT) (fig. 7-51).

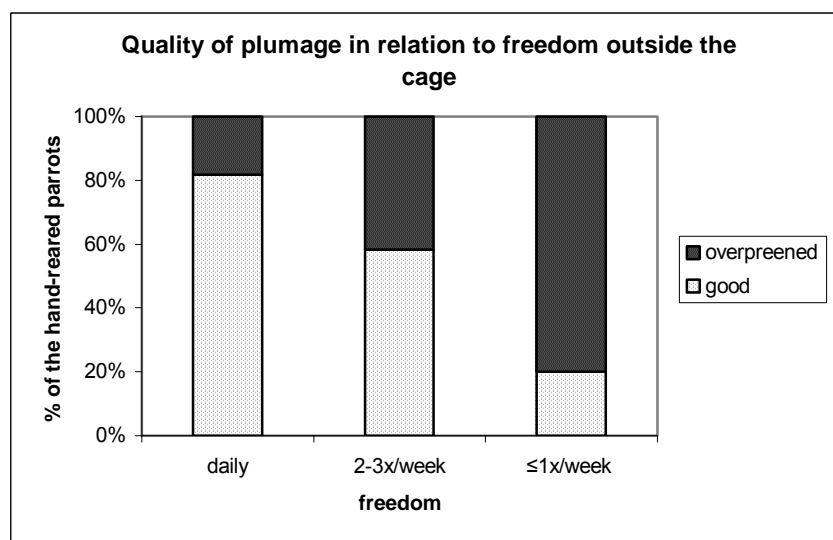


Figure 7-51

Besides, the hand-reared parrots that could never accompany their owners outside (chained or totally free when the wings had been trimmed) were inclined to over- or underpreen their plumage ($p = 0.063$ FT). 9.1% of the birds that were free outside over- or underpreened, as against 42.9% of the parrots that were not.

7.9.5 DIET

Mouth-to-beak-feeding: 40.8% of the birds which were sometimes fed from "mouth-to-beak" by their owners begged for food, compared with only 19.6% of the parrots that did not get food that way ($p = 0.018$). What is striking is that the hand-reared parrots seemed to be much more influenced by that factor than the birds that had not been hand-reared.

7.10 SOCIAL CONTACT: ITS INFLUENCE ON THE PARROTS' BEHAVIOUR

7.10.1 BOND AND SOCIAL CONTACT WITH OTHER PARROTS

With parrot(s): the birds that were kept with one or several parrot(s) (not only African greys), were much less fearful ($p = 0.0005$ FT). Only 2 birds (8.7%) belonging to the group "with parrot(s)" had developed such anxiety, as against 37 parrots (50.0%) of the group "alone".

The birds that were kept with parrots had less stereotyped behaviour as well, even the ones that were housed in rather small cages ($p = 0.012$), which reveals that social deprivation is another trigger for stereotypic movements.

Besides, those birds were much more sexually active in general (with humans or with parrots) ($p = 0.0018$). 57.6% of the birds that were kept alone were sexually inactive, as against 25.6% of the parrots that were kept with other psittacine birds.

Partner: this parameter takes into consideration the species the parrots had chosen as their main bond or as their sexual partner. Some birds had chosen humans as partners, for example, even though they were kept with other parrots. Others had changed their bond from one species to another.

The parrots that had chosen a human being as a partner, were inclined to be sexually inactive ($p = 0.0018$ FT), to develop anxiety ($p = 0.003$ FT), to become more aggressive ($p = 0.022$ FT), to screech more ($p = 0.035$ FT) and were prone to beg for food (0.041 FT).

The birds that had no partner tended to be more aggressive towards humans and showed more stereotypies. Unfortunately, there were only 7 birds in this category, not enough to allow a statistical analysis (fig. 7-52 and fig. 7-53).

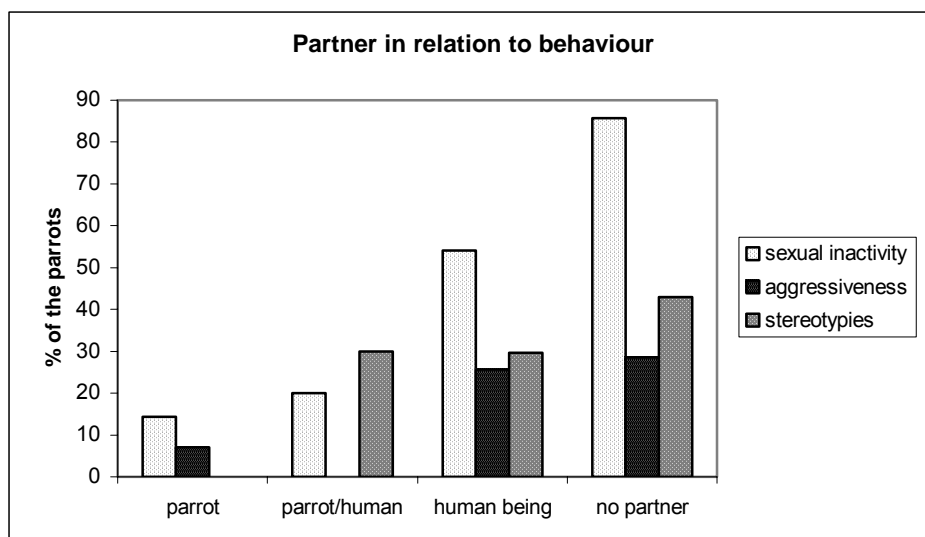


Figure 7-52

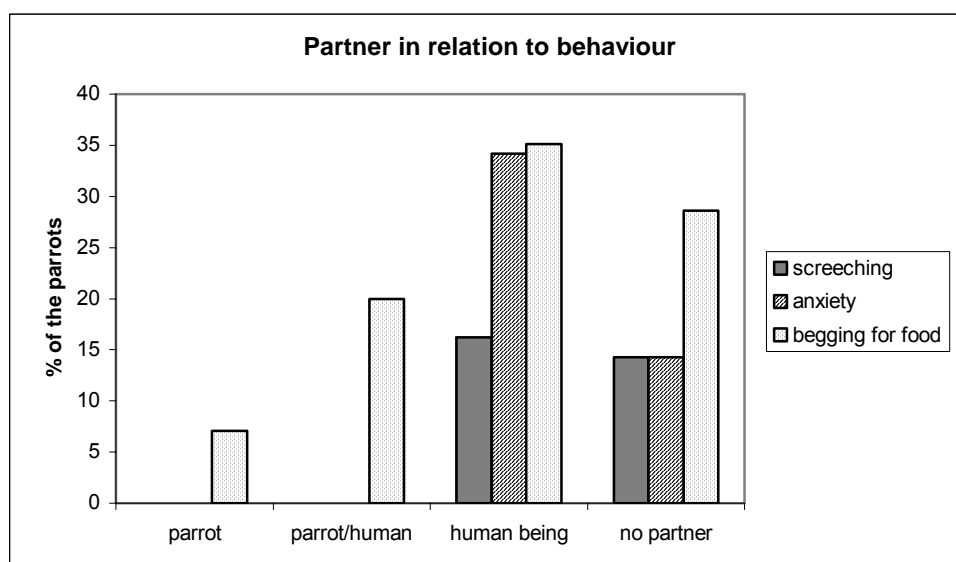


Figure 7-53

7.10.2 SOCIAL CONTACT WITH HUMAN BEINGS

Owners' response to undesirable behaviour: an inappropriate reaction (such as physically punishing the parrot, spraying it with a water pistol, for more details see chapter 6.3) induces anxiety ($p = 0.002$ FT) and aggressiveness (esp. flying attacks) ($p = 0.018$ FT). The parrots in this group also seemed to develop nervous repetitive habits more easily ($p = 0.054$ FT) (fig. 7-54).

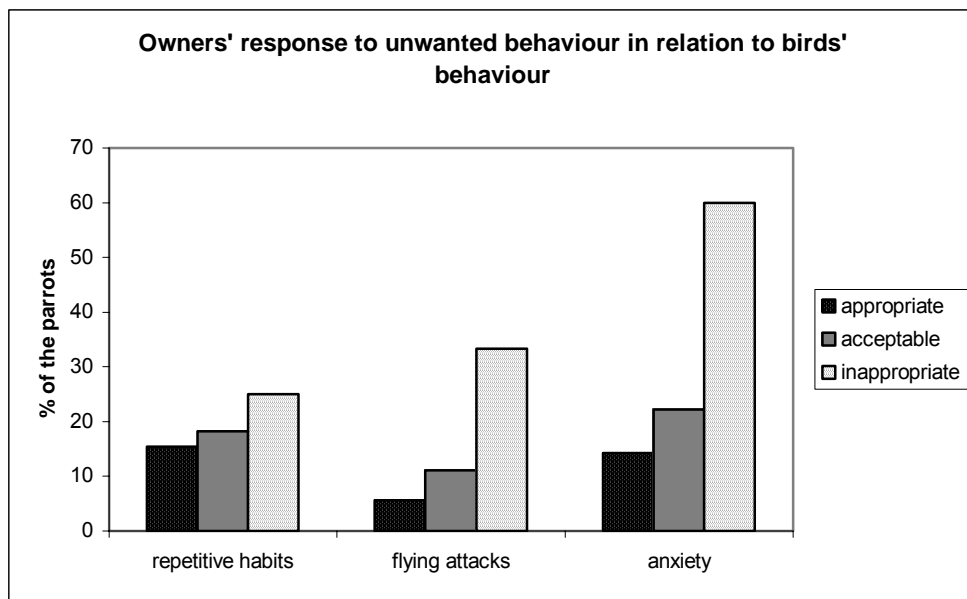


Figure 7-54

The response: "covering the cage" (as a reaction to the parrots' unwanted behaviour) triggered the same changes in the parrots' behaviour as described above (it particularly increased aggressiveness ($p = 0.0078$ FT). Besides, these parrots developed significantly more stereotypies than the birds belonging to the other category ($p = 0.001$), which is a very similar reaction to the one triggered by the owners that cover the parrots' cages every night (fig. 7-55).

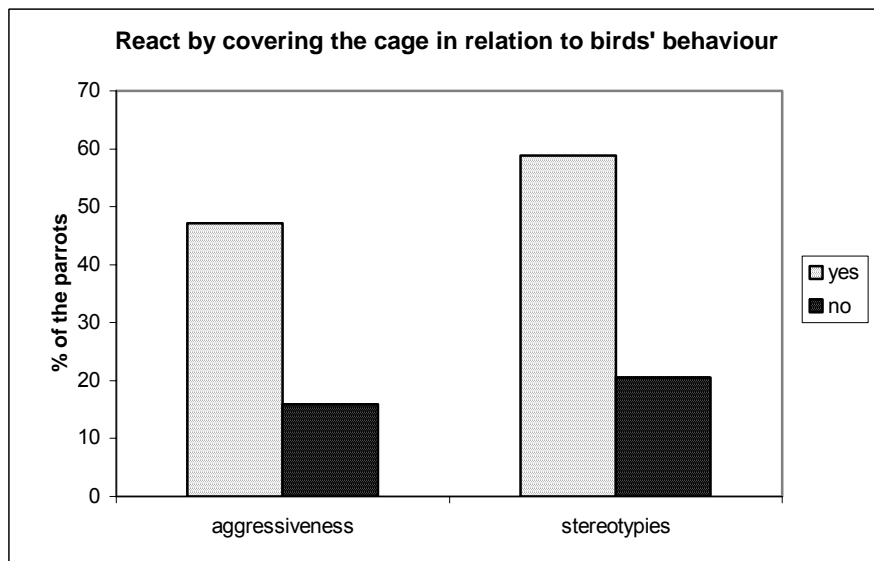


Figure 7-55

For all other sorts of reactions, such as "ignoring the bird", "shouting at it", "putting it back into its cage", "saying no", "distracting it with gestures", "distracting it with sounds", "leaving the room" or "physically punishing it", there was no specific trend or significant influence on the parrots' behaviour.

Approach to the bird: an owner's inappropriate approach to the bird significantly led to screeching ($p = 0.0060$ FT), to increased aggressiveness ($p = 0.039$ FT) and to the development of stereotypic movements ($p = 0.048$ FT). Besides, the hand-reared parrots belonging to this group over- or underpreened their plumage significantly more often than the parrots whose owners' approach was appropriate ($p = 0.015$ FT) (fig. 7-56).

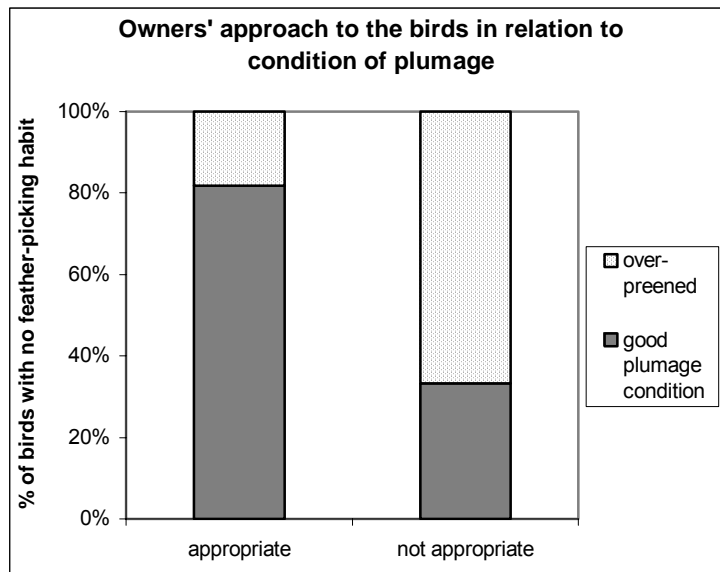


Figure 7-56

The owners took no notice of the parrots' moods: this category concerns the parrots whose warnings were not taken into consideration by their owners and that were "forced" to let themselves be handled or scratched even when they were not in the right mood. Those owners' behaviour contributed to passing over the individual distance of the parrot. This significantly enhanced the development of stereotypies for all the birds ($p = 0.025$ FT), as shown in figure 7-57. The hand-reared birds belonging to this group had the tendency to over- or underpreen more than the other birds. This result was not significant, probably due to the small number of birds ($p = 0.082$ FT) (fig. 7-57).



Figure 7-57

Training: some owners had trained their parrots to come onto their hands on command or to defecate only in their cages. The parrots that had been trained showed significantly more nervous repetitive habits than the parrots that had not ($p = 0.0084$).

No presence of the family: the parrots belonging to people living alone developed anxiety ($p = 0.075$ FT) and stereotypic movements ($p = 0.0082$ FT) significantly less often than the birds whose owners lived in couples or had a family. That shows that the presence of other persons in the house can be stressful for the bird (fig. 7-58).

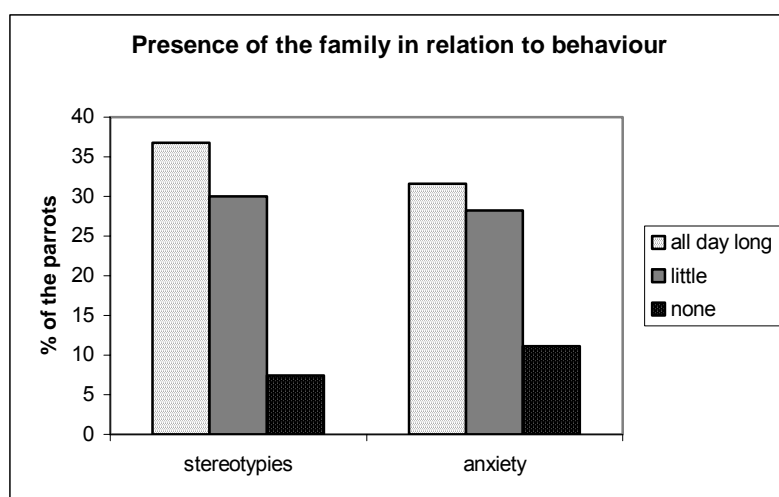


Figure 7-58

Type of relationship with the owners: "close": 81.8% of the birds belonging to this group regurgitated for their owners, as against 59.1% of the "very close" category and 41.0% of the "neutral" one ($p = 0.0006$). "Neutral": only 5.1% of the birds in this group displayed sexual behaviour with the owners, compared with an average of 46.6% of the birds in both the "close" and "very close" groups ($p = 0.000014$ FT).

Owners' availability: as shown in figure 7-59, the more time the owner spent with the parrot, the more the bird begged for food.

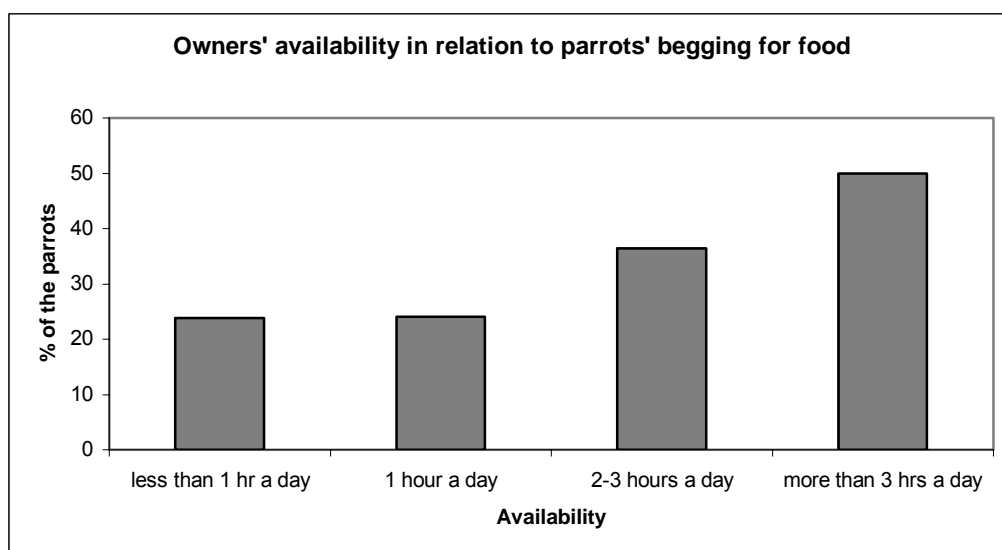


Figure 7-59

Maintenance only: merely 6.3% of the birds, that were attended to exclusively for their maintenance displayed sexual behaviour with their owners, as against 42.5% of the birds belonging to the other category ($p = 0.00018$ FT). Besides, the former parrots regurgitated less than the latter birds as well ($p = 0.0007$).

7.11 PAST EXPERIENCES: THEIR INFLUENCE ON THE PARROTS' BEHAVIOUR

7.11.1 AGE AT THE TIME OF PURCHASE, ACQUISITION

As the percentages in figure 7-60 point out, it looks as though the younger the parrots had been at the time of purchase, the more sexually active they became.

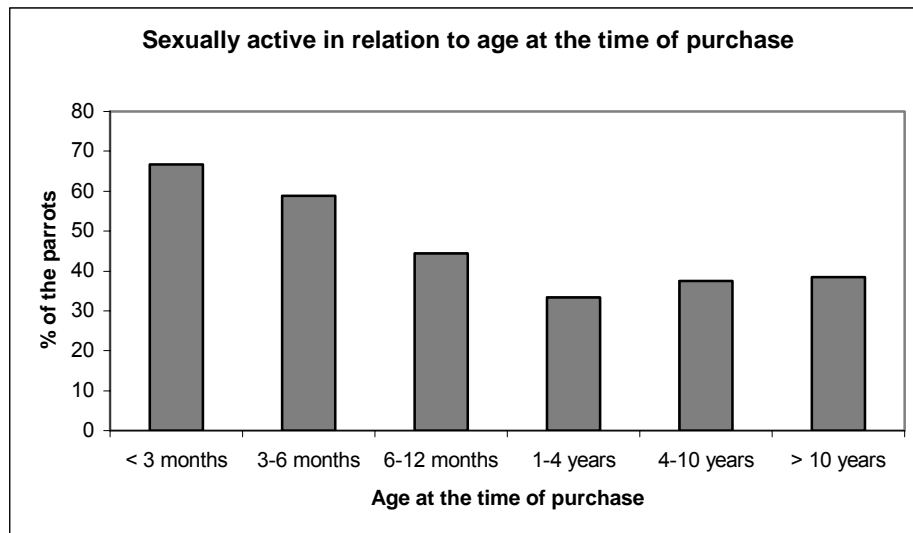


Figure 7-60

Acquisition: the birds that were purchased in pet shops tended to develop more often anxiety than the birds that were purchased at breeders' or at previous owners' homes ($p = 0.076$ FT) (fig. 7-61).

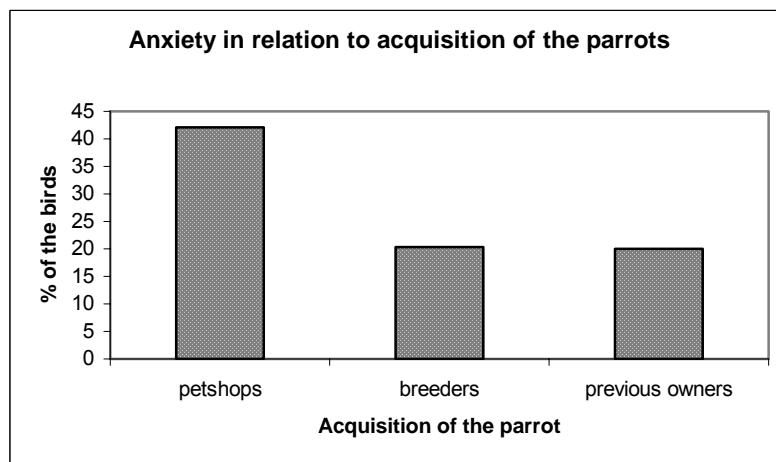


Figure 7-61

7.11.2 CARE GIVEN BY PREVIOUS OWNERS

Change of housing: 78.6% of the birds that are currently looked after better than at the previous owners' (positive change of detention) pick their feathers, as against 35.3% of the parrots whose quality of detention did not change from one owner to the next ($p = 0.029$ FT).

Estimation of the previous owners: the parrots that were not properly cared for by their previous owners (13 birds) developed more stereotypies and anxiety than the birds that were well kept (9 parrots). Unfortunately, there were not enough subjects in each group to allow a statistical analysis of

the situation (fig. 7-62). In the same way, 55% of the parrots belonging to the category "appropriate housing" were still sexually active, as against 15.4% of the birds of the other group.

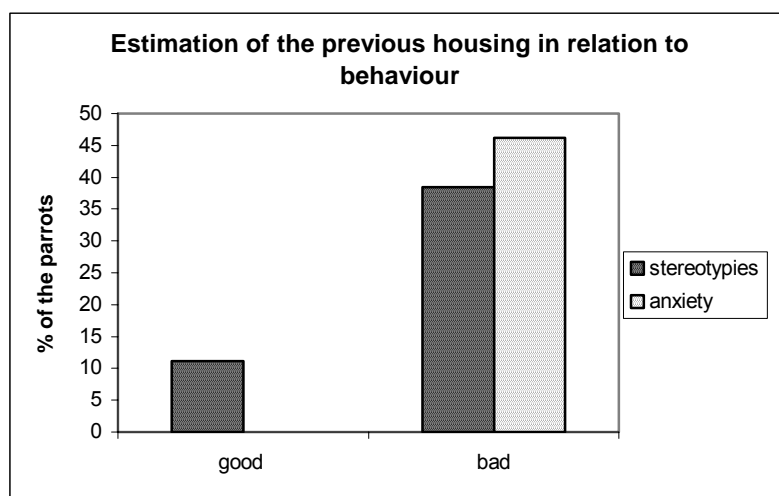


Figure 7-62

7.12 SEX, AGE AND HEALTH: THEIR INFLUENCE ON THE PARROTS' BEHAVIOUR

7.12.1 SEX

The females seemed to be inclined to screech more than the males. 20.6% of the females (= 7 birds) were screechers, compared with only 2.8% of the males (= 1 bird) ($p = 0.026$ FT).

7.12.2 AGE

Most of the aggressive parrots belonged to the group "4 to 7" years old (38.2% of the birds were in that class), which concerned the birds that had just become sexually mature. 14.3% resp. 15.2% of the birds in the group "15 to 35" resp. "7 to 15" and none of the birds either under 4 or over 35 were aggressive (fig. 7-63).

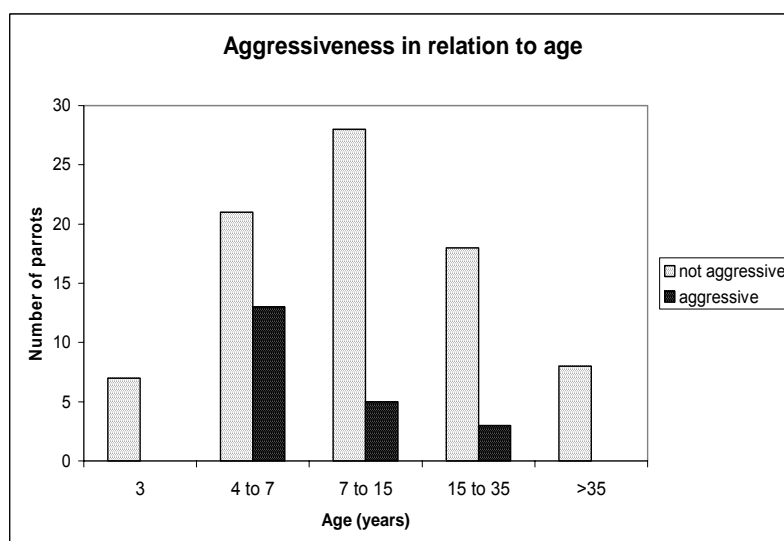


Figure 7-63

7.12.3 HEALTH

The parrots' health had no obvious influence on the behaviour of the birds that were considered in the study.

7.13 BEHAVIOUR

7.13.1 THE CORRELATION BETWEEN BEHAVIOURAL DISORDERS

Most of the behavioural problems were connected with each other. That means that a lot of parrots that had developed one problem tended to contract other problems as well. The most important correlations with their probability are represented in table 7-64. Some links were only seen in the case of hand-reared parrots, probably because of their increased tendency to develop behavioural problems, and are shown in table 7-64 with oval-ended arrows.

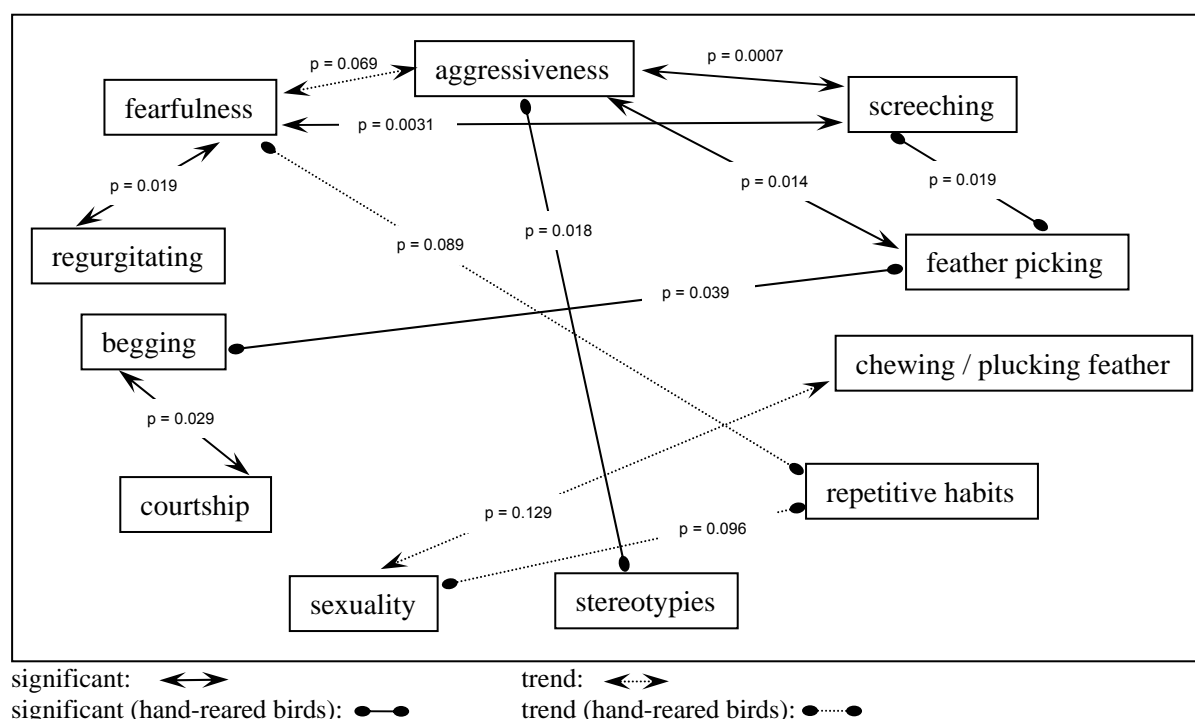


Table 7-64

Relationships between criteria that are not represented in the table above are described further down in the text.

Aggressiveness in relation to feather picking: the parrots that were aggressive tended to pick their feathers more and also to have their plumage in a worse state than the not aggressive parrots (fig. 7-65).

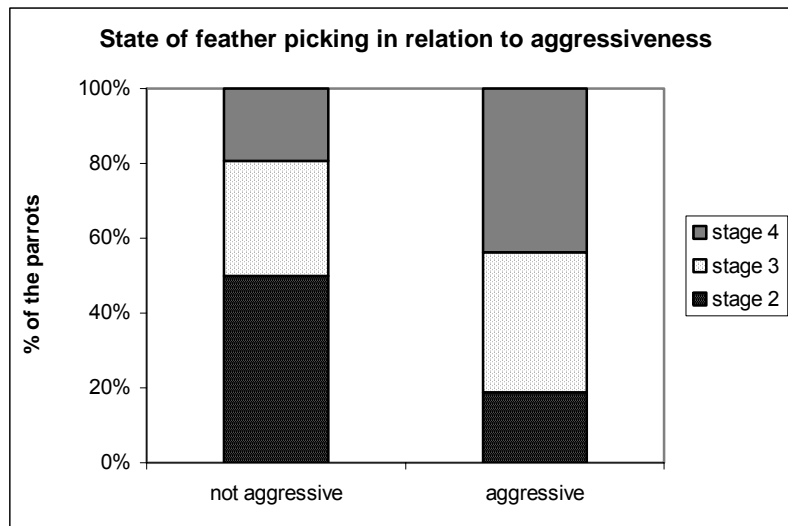


Figure 7-65

Later aggressiveness in relation to behaviour at the time of purchase: the hand-reared birds that became aggressive had tended to be neither timid nor fearful at the time of purchase ($p = 0.053$ FT).

Feather picking in relation to selective behaviour: 23.1% of the parrots that picked their feathers were significantly more aggressive towards people of one particular sex, as against only 5.7% of the birds that did not pick their feathers ($p = 0.021$ FT). Regarding the preference for one sex, the percentages of the two groups were very similar.

Method of feather picking in relation to behaviour at the time of purchase: the parrots that had been "curious/playful" tended to chew their feathers ($p = 0.00036$ FT). In the "not curious" group there were no parrots that chewed their feathers.

Screeching in relation to reasons why they bite: according to the owners, the hand-reared birds that bit out of "jealousy" were inclined to screech more ($p = 0.052$ FT). That tendency was not to be seen in the case of the parrots that had not been hand-reared. Both the hand-reared and naturally reared parrots that bit in order to show their dominance also tended to screech more ($p = 0.039$ FT).

Anxiety in relation to behaviour at the time of purchase: the parrots that had been fearful at the time of purchase (hand-reared or not) were inclined to develop anxiety towards one specific object or situation ($p = 0.004$). The parrots whose owners considered not to be tame at the time of purchase also tended to become more fearful once mature ($p = 0.0022$).

Anxiety in relation to selective behaviour: the birds that had developed anxiety were significantly more selective towards humans than the parrots that had not ($p = 0.008$) (fig. 7-66).

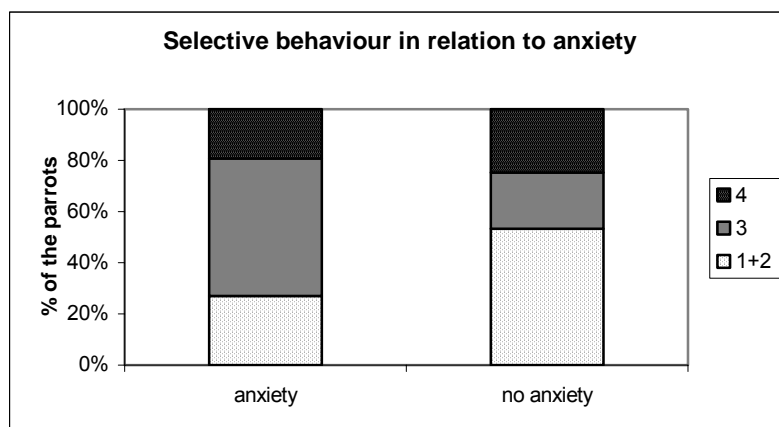


Figure 7-66

Stereotypies in relation to stage of feather picking: the parrots that had developed both stereotypic movements and feather picking had their plumage in a worse state than the birds that picked their feathers without showing stereotypies ($p = 0.044$ FT).

Sexuality in relation to reasons why they bite: the birds that bit to show their dominance over human beings were usually sexually active, either with another parrot or with humans ($p = 0.115$ FT).

Sexually activity with human beings in relation to mimicry ability: the parrots that were sexually active with humans mimicked words and sentences better than the parrots that were not. Unfortunately, there were not enough birds in each category for the statistics, so the probability could not be calculated.

8 GENERAL DISCUSSION AND CONCLUSIONS

8.1 DISCUSSION ON THE MAIN RESULTS

8.1.1 THE INFLUENCE OF THE BREEDING METHOD ON THE BIRDS' BEHAVIOUR

In the study, the hand-reared birds were much more aggressive towards human beings than the parrots that had not been hand-reared. According to the owners, they attacked people especially often to show their dominance and because of "jealousy". In addition, they were much more selective towards human beings than the naturally reared birds. They were also inclined to have infantile behaviour (begging) and to be clumsy. Besides, the hand-reared parrots that picked their feathers usually chewed them rather than plucked them. On the other hand, the hand-reared parrots that did not pick their feathers tended to over- or underpreen their plumage. Most of these results can be explained either by imprinting on humans or by the lack of socialization with conspecifics during the parrots' juvenile periods.

The wild-caught birds picked their feathers significantly more often than the captive bred parrots. Contrary to the hand-reared parrots, they usually plucked their feathers instead of chewing them. They seldom bit, but when they did, their behaviour was interpreted as a fear response by the owners. They frequently developed aggressiveness towards one specific sex (usually towards men). Besides, the wild-caught parrots had very often developed anxiety and were in rather poor health at the time of visit. Those observations are all related to the considerable stress that the birds endured during their capture, transport and quarantine. However, some results could also be due to the antibiotic treatment in quarantine.

The parent-reared birds were generally in very good health. However, it was very difficult to come to any conclusions about them because of the small number of birds available. Nevertheless, the parent-reared parrots seemed to have well-balanced behaviour and to be less prone to becoming problematic for the owner. Analogous to wild-caught parrots, when they picked their feathers, they usually plucked them and they seldom bit, but when they did, the owners interpreted it as a fear response. Nonetheless, they did not tend to develop anxiety like the wild-caught parrots.

8.1.2 THE INFLUENCE OF THE HAND-REARING METHODS ON THE BIRDS' BEHAVIOUR

When the chicks had been left at the most two weeks in the nest, they were less active sexually later on and had more difficulty leading a normal sexual life with another parrot. The parrots that had spent less than 5 weeks with their parents before being removed for hand-rearing showed significantly more stereotypic movements once adult than the hand-reared birds that had stayed longer with their parents. The parrots that had been removed from the nest at the time when the main feathers were growing (at 6 weeks of age) were prone to pick their feathers once adult. Those statements show that the longer chicks are fed by their parents (at least for 5 weeks or preferably 8 weeks), the fewer consequences hand-rearing has on the birds' development and behaviour. Besides, the parrots that had stayed less than 5 weeks in the nest seemed to mimic human words and sentences slightly better than the other parrots. They also tended to pluck their feathers more than to chew them when they did pick their feathers.

The chicks that had been hand-fed using tubes became more aggressive, attacked human beings by flying at them significantly more often, screeched more often, had tended to be fearful at the time of purchase and were in a much poorer state of health than the parrots that had been hand-fed using non-

invasive implements. The chicks that had been spoon-fed were particularly tame at the time of purchase. Tube-feeding is probably unpleasant and more stressful for the birds than spoon-, syringe- or pipette-feeding. Besides, it is also less hygienic, as tubes cannot easily be cleaned properly.

The parrots that had been hand-reared isolated from other birds tended to beg more once adult, to be more selective towards humans and were less inclined to display normal sexual behaviour with other parrots. Besides, the parrots that had come into close contact with human beings during the hand-rearing period were less likely to behave sexually normally with parrots and usually chose humans as partners, compared with birds that had had minimal contact with human beings during rearing. Those observations are certainly due to the fact that those parrots are more imprinted on humans and therefore consider the owner as a sexual partner. Besides, their lack of socialization with conspecifics prevents them from going through the normal stages of development and encourages them to display infantile behavioural patterns in spite of their sexual maturity.

The chicks that had been purchased before reaching their independence and that had been weaned at the owners', frequently over- or underpreened their plumage. Though they were less prone to pick their feathers than the parrots that had been weaned at the breeders', the stage of feather picking was usually worse in that group. Besides, the chicks that had been weaned at the owners' developed significantly more often aggressiveness towards specific objects, which might also be triggered by spoon-feeding. The weaning period of those parrots had tended to last longer as well.

Rearing methods: conclusion

The results confirm that the breeding method has an obvious influence on the behaviour of African grey parrots. The trauma endured by the birds that are captured in the wild is considerable. This stress has very long-lasting consequences on the behaviour of those intelligent and very sensitive birds. As enough African grey parrots can be bred in captivity, their capture is not necessary and cannot be justified any more. Hand-reared parrots tend to become more problematic for the owners than parent-bred and wild-caught birds. Nevertheless, some methods used to hand-raise chicks have fewer consequences on the birds' adult behaviour, such as spoon-, syringe- or pipette-feeding, a long stay in the nest with the parents and less social contact with human beings during hand-rearing, and therefore should be more often applied. Besides, the chicks should always be kept with other parrots during hand-rearing, if possible belonging to the same species. Once they have fledged, it is fundamental to keep the young parrots with conspecifics (immature and adult parrots as well) in aviaries for a few weeks, so that they can learn all the species-specific behavioural patterns.

The imprinting and the first social interactions of grey parrots are crucial for the normal development of their behaviour and should not be underestimated. Parent-reared parrots can become quite tame, though some patience is required to gain the parrots' confidence. They are usually well-balanced birds which have learnt all the specific behavioural patterns of that wild parrot species. Besides, this method gives the opportunity to the parents to rear their chicks naturally, which is certainly a considerable benefit for their welfare. On a long-term basis, parent-rearing also prevents the breeding pairs from losing their ability to rear their chicks naturally, which could potentially be a dramatic consequence of systematically hand-rearing chicks.

8.1.3 INFLUENCES OF OTHER FACTORS, SUCH AS HOUSING, CARE, CLIMATE, SEX, AGE AND SOCIAL CONTACT ON THE PARROTS' BEHAVIOUR

In addition to an increase in **stereotypic movements** in hand-reared parrots that stayed less than 5 weeks in the parents' nests, those abnormal movements were found particularly often in parrots that came into constant contact with the owners or with members of the family and in birds that were housed in an inhabited room. Besides, parrots that were kept alone and birds that did not consider anybody as a partner (and were therefore socially deprived) developed stereotypies more often.

Furthermore, an inappropriate approach to the parrots (owners' nervous or noisy demeanour), covering the birds' cages either as a reaction to undesired behaviour or as a routine every night, and the non-respect of the parrots' moods and individual distance favoured the development of this abnormal behaviour. Finally, a lack of complexity in the birds' environments, such as small cages with standard manufactured perches and no toys inside or outside the cages seemed to contribute to the development of stereotypic movements.

Repetitive habits seemed to be what some parrots used to manifest their frustration. The presence of many toys outside the cages which were out of the parrots' reach but were visible to the animals seemed to trigger such behaviour. Trimmed feathers, which prevent birds from escaping by flying, though this is their most natural reaction when they feel threatened, induced the development of such abnormal movements (especially in the naturally reared birds). Besides, the parrots that were trained and the birds whose owners reacted inappropriately to undesired behaviour tended to develop such habits more often.

In addition to increased aggressiveness in the hand-reared parrots, in particular in the birds that had been tube-fed, **aggressiveness** was especially often encountered in the parrots whose owners had an inappropriate approach to them as well as an inappropriate reaction (such as covering their cages) to unwanted behaviour. The parrots that were between 4 and 7 years old, that had chosen human beings as partners or had no partners, were especially aggressive towards people. Furthermore, little stimulation in the birds' environments and an inappropriate night-day ratio seemed to increase aggressiveness.

Anxiety was often encountered in the wild-caught parrots. Besides, a lack of complexity and changes in the parrots' environments, such as no litter or only paper at the bottom of the cages, infrequent changes in the cages or keeping the birds that considered humans as partners alone, played a role in the development of anxiety. Furthermore, situations that may have been considered as stressful by the parrots or that triggered a feeling of insecurity, such as perches placed low in the cages, inappropriate reactions of the owners to the parrots' undesired behaviour, covering the cages as a reaction to such behaviour or as a routine every night and the constant presence of the families also predisposed the birds to develop anxiety.

Excessive screeching was most frequently encountered in females and in parrots that considered human beings as substitutive partners. Besides, factors contributing to boredom, such as no litter and no toys in the cages, led to screeching. Further, the motivation of the birds' response to certain stimuli, such as the location of the cages next to a window or in an inhabited room with constant contact with the owners, but also perches placed outside the cages, seemed to trigger excessive screeching. An inappropriate approach of the owners to the birds contributed to the development of screeching.

A very high percentage of the wild-caught parrots picked their feathers. As **feather picking** can be triggered by numerous stimuli, most of those factors had only a slight influence on the birds' behaviour and only few of them had a significant effect. The parrots whose cages were located next to a window and that had no litter to nibble picked their feathers particularly frequently. On the other hand, the parrots that were kept in a very humid environment (more than 60%) picked their feathers much less than the other birds.

The method used to pick the feathers seemed to be related to the parrots' rearing-methods (the hand-reared parrots tended to chew their feathers rather than to pluck them) as well as to other factors. The parrots whose cages were covered every night **plucked** their feathers rather than chewed them. On the other hand, the parrots housed in a dry environment and the birds that seldom had the opportunity to bathe **chewed** their feathers.

It was exclusively the hand-reared parrots that **over- or underpreened their plumage**. Some environmental factors seemed to contribute to this behaviour, such as seldom having the opportunity to bathe, an inappropriate night-day ratio and a daily exposure to the sun. Besides, social frustration

played a role. An inappropriate approach to the birds, non-respect of the parrots' moods and individual distance, too rare freedom out of their cages or out of doors led to over- or underpreening in the hand-reared parrots.

Infantile behaviour (begging) was particularly displayed by the hand-reared parrots. The parrots that considered humans as partners and that were given food from mouth to beak, as well as the birds whose owners were available most of the time, displayed that behaviour very often.

Several stimulating factors in the birds' environments, such as the shiny wire mesh of some cages, a bright environment, the cages located next to windows or the cages moved daily onto the balconies and the presence of toys in the cages, increased their **sexual activity**. **Mating attempts on the owners' shoes or hands** were the result of a close relationship with the owners and small cages. The birds that were located in an inhabited room and whose cages were placed next to windows and that had a close relationship with the owners **regurgitated** particularly frequently for them.

Care and housing: conclusion

Those results demonstrate that African grey parrots are very sensitive birds whose demeanour can easily be influenced by their environment as well as by their care and housing. Especially social contact with other birds and the relationship with the owners both play a predominant role in the birds' well-being and behaviour. The importance of their social needs should therefore never be underestimated.

Most behavioural disorders can be prevented by housing the birds in pairs in aviaries with sufficient occupation. Besides, the understanding of the parrots' behaviour and body language is very important so as to respect their individual distance and can successfully prevent the owners from triggering fearful or aggressive responses of the birds. It is thus essential for the parrots' welfare to take into consideration and to optimise the factors that have an influence on the birds' behaviour.

8.2 USE OF THE QUESTIONNAIRE

The questionnaire used contained as many closed questions as possible in order to facilitate the analysis of the results. The questionnaire was very long and therefore was not sent to the owners. The questions could be explained in detail to the owners, so that they could be answered with precision. Besides, the investigations at all the owners' homes were made by the same person and the questions were thus always asked in a very similar way.

Most of the time, the exact hand-rearing method of the parrots was unknown at the time of the visit, as the information was obtained after the visit by phoning the breeder. This procedure prevented the interviewer from influencing and biasing the answers by personal views and hindered the development of potential prejudices against some hand-rearing methods. The rearing method of the parrots (hand-reared, parent-reared and wild-caught) was known, so the opinion of the interviewer could still play a slight role in the answers. However, all the answers that were not totally objective were reconsidered using the data evaluation key (see chapter 6.3) once all the parrots had been examined. In order to achieve this, the individuals were recorded as numbers and their origins or rearing methods were therefore not visible during the evaluation of the results. Thanks to this method, the bias due to our expectations could be reduced to a minimum.

8.3 SUBJECTIVITY OF THE METHOD

8.3.1 OBSERVATION PERIOD AND INTERVIEWER'S CONTACT WITH THE PARROT

Each parrot was observed at the owner's homes (apart from two parrots, as one of them had died a few months before the visit and as the other bird was in Morocco when the owner was interviewed). Most of the parrots could be observed during the whole interview (which lasted approximately two hours), except for the birds that for one reason or another could not be put into the same room as the interviewer and the owner. After the interview, at least 10 minutes were always taken to examine the animal closely and to try to come into contact with the parrot. The parrot had got used to the intruder's presence by then and had started acting as if nothing new had happened in its environment.

The parrot's behaviour and reaction to the intruder's attempts to come into contact with it were carefully observed and noted down in the questionnaire. If the bird was tame and did not have an excessively aggressive demeanour towards the intruder, she tried to scratch its head and to take the parrot onto her hand. If the bird did not react in an aggressive or defensive way to such physical contact, the interviewer tried to stroke the bird on its belly or on its back. In addition to the observation of the bird, the owner's approach to the parrot was always taken into consideration.

The observation of the parrot's demeanour during the visit gave us only supplementary information which helped us get a better overview of the parrot's character and which was not used in the statistical analysis, as a parrot's behaviour and reaction can vary from one day to another as well as the intruder's mood and approach to the bird.

8.3.2 OWNER'S SUBJECTIVITY

Even though most answers were quantified (e.g. every day, once a week, etc) and did not use subjective concepts, such as "a lot" or "seldom", the owner's subjectivity was a major drawback in the method and in the interpretation of the bird's behaviour, care and housing. This subjectivity can be due to two main factors.

On the one hand, it can be triggered by the guilty conscience of the owner, if he/she knows that the care provided for the bird is not optimal. For example, if the bird keeper knows that it is beneficial to the parrot to put twigs and branches into the cage regularly, but provides fresh branches only once a year for the parrots, he/she would tend to exaggerate unwittingly when questioned.

On the other hand, subjectivity can be due to the owner's emotional bond with his/her parrot. For instance, an aggressive bird to which the owner is extremely attached is usually not considered as being "very aggressive" by the owner. Consequently, the owner probably underestimates the frequency of flying attacks and biting, which could affect the interpretation of the parrot's level of aggressiveness.

However, as the meeting lasted for quite a long time, allusions to problems in the bird's behaviour or to some shortcomings in the bird's care usually naturally cropped up during the interview.

9 SUMMARY

9.1 SUMMARY

The purpose of this study was to see how hand-reared, parent-reared and wild-caught African grey parrots differ in their behaviour. Moreover, the hand-raised parrots were divided into several categories in order to examine the influence of the different hand-rearing methods on the birds' behaviour.

A questionnaire containing 138 multiple choice questions about the breeding method, care, housing, health, origin, previous owners, behaviour and social interactions was filled in at the homes of the owners of 105 grey parrots which were at least 3 years old and whose origins were known. In addition, 61 questions were answered by observing the birds. The breeders were also contacted and asked 11 questions concerning the hand-rearing method used.

The results were statistically analysed using the Chi-square Test and the Fischer's Exact Test (NCSS 2001). They were based on the questions answered by the owners. Many complex behavioural patterns (e.g. aggressiveness or selective behaviour) were evaluated with a key taking into account several criteria. All subjective answers were checked and adjusted using several objective components.

- **The hand-reared parrots** were more aggressive and more selective towards human beings than the naturally reared birds. The hand-reared parrots that picked their feathers chewed them rather than plucked them. The birds that did not pick their feathers often over- or under-preened their plumage. Besides, the hand-reared parrots were clumsier and begged for food more often than the parrots that had not been hand-reared.
- The hand-reared chicks that were **less than 5 weeks old** when removed from the nest developed stereotypic behavioural patterns more often than the chicks that stayed longer with their parents.
- The chicks that had been **hand-fed using tubes** were more aggressive, screeched more and were in poorer health than the birds that had been fed using syringes, pipettes or spoons.
- The birds that had had **minimal human contact during hand-rearing** were able to lead more easily a normal sexual life with another parrot than the parrots that had been constantly with human beings during the hand-rearing period.
- The chicks that had been **sold before weaning** under- or overpreened their plumage and had had a longer weaning-period than the chicks which had been weaned at the breeders'.
- **The wild-caught parrots** picked their feathers more often, were in poorer health and had developed anxiety more often than the parent-reared or hand-reared birds.
- Many observations concerning the influence of **other factors** (such as care and housing) on the birds' behaviour were made as well.

This study leads us to conclude that the breeding method has an obvious influence on the behaviour of grey parrots. Hand-reared parrots tend to become more problematic than parent-bred and wild-caught birds. Nevertheless, some methods used to hand-raise chicks have fewer consequences on the birds' adult behaviour, such as spoon-feeding, a long stay in the nest with the parents and less social contact with human beings during hand-rearing, and therefore should be more often applied. The imprinting and the first social interactions of grey parrots are crucial for the normal development of their behaviour and should not be underestimated.

Parrots are often systematically hand-reared to satisfy the pet trade demand. The (too seldom) parent-bred grey parrots are usually used for breeding purposes, although they can become very tame and are

usually less problematic than hand-reared birds. The import of wild-caught grey parrots is still legal in Switzerland, although enough birds could be bred in the country.

Grey parrots, as very sensitive, social and intelligent wild birds, often develop behavioural problems in captivity. Their social and environmental needs are very seldom fully satisfied. It is becoming essential to understand the parrots' complex behaviour and specific needs better, as interest in parrots is growing as well as their importance on the pet trade market.

9.2 ZUSAMMENFASSUNG

Ziel der Studie war, zu untersuchen, inwieweit a) handaufgezogene (verschiedene Handaufzucht-Methoden), b) wildgefangene und c) durch ihre Eltern aufgezogene Graupapageien sich in ihrem Verhalten, namentlich in Bezug auf das Auftreten von Verhaltensstörungen, unterscheiden.

105 mindestens 3-jährige Graupapageien, deren Herkunft bekannt oder nachvollziehbar war, wurden in der Studie eingeschlossen. Die Besitzer wurden besucht und in 138 multiple-choice Fragen befragt über die Aufzuchtmethode, die Herkunft, die vorherigen Besitzer, die Haltung, die Pflege, die Fütterung, die Gesundheit, das Verhalten und den Sozialkontakt der Vögel. Daneben wurden 61 Fragen durch die Beobachtung des Tieres beantwortet. Den Züchtern der handaufgezogenen Papageien wurden 11 zusätzliche Fragen über die angewandte Handaufzuchtmethode gestellt.

Die Datenbank wurde mittels Access 2002 erstellt, die statistische Auswertung erfolgte mittels Chi-quadrat Test und two-tailed Fischer's Exact Test (NCSS 2001). Sie stützte sich auf die Antworten der Besitzer. Manche komplexe oder etwas subjektiv beschriebene Verhaltensweisen bzw. Antworten (z.B. Aggressivität oder Selektivität) wurden mit einem entsprechenden Auswertungssystem, das mehrere objektive Kriterien umfasst, erfasst.

- **Handaufgezogene Papageien** waren aggressiver und selektiver gegenüber Menschen (d.h. akzeptierten nur von wenigen Menschen, gekraut bzw. berührt zu werden) als Naturbruten und Wildfänge. Im Fall von Federrupfen wurden die Federn eher angeknabbert als ausgezogen. Die Papageien, die ihre Federn nicht rupften, zeigten eine schlechtere Gefiederpflege. Daneben waren die Handaufzuchten ungeschickter beim Klettern und zeigten häufiger infantiles Verhalten (Futterbetteln) als Naturbruten und Wildfänge.
- Die handaufgezogenen Papageien, die **vor der 5. Lebenswoche aus dem Nest** genommen wurden, zeigten signifikant mehr stereotype Bewegungen als die Küken, die länger im Nest gelassen wurden.
- Die Küken, die **mittels einer Kropfsonde gefüttert** wurden, waren aggressiver, schrieten mehr und waren in einem schlechteren Gesundheitszustand als die Papageien, die mit einem Löffel, einer Spritze oder einer Pipette gefüttert wurden.
- Die Vögel, die über einen **Minimalkontakt zum Menschen** während der Handaufzucht verfügten, waren häufiger in der Lage, ein normales Sexualverhalten mit Artgenossen zu zeigen als die Papageien, die ständig Kontakt mit Menschen während der Aufzucht hatten.
- Die Küken, die **vor dem Absetzen verkauft** wurden, pflegten ihr Gefieder schlechter; zudem dauerte es länger, bis sie selbstständig fressen konnten als die Küken, die beim Züchter futterfest geworden sind.
- **Wildfänge** rupften ihre Federn vermehrt, waren in einem schlechteren Gesundheitszustand und hatten öfter spezifische Ängste vor Gegenständen entwickelt als Nachzuchten.
- Zahlreiche Beobachtungen über den Einfluss von **anderen Faktoren** (wie z.B. Pflege und Haltung) auf das Verhalten von Graupapagien wurden daneben auch erfasst.

Die Resultate veranschaulichen, dass die frühen Erlebnisse und die Sozialisierung der Graupapageien einen eindeutigen Einfluss auf ihr späteres Verhalten haben. Handaufgezogene Tiere neigen im allgemeinen vermehrt dazu, im Verhalten problematisch zu werden. Einige Handaufzuchtmethoden haben dennoch weniger negative Konsequenzen auf das Verhalten von Graupapageien, wie die Löffelfütterung, ferner die Küken mindestens 5 Wochen bei den Eltern belassen und so wenig Kontakt wie möglich mit Menschen während der Handaufzucht gewähren, und sollten deswegen öfter angewandt werden. Die frühen Sozial-Interaktionen sind entscheidend für die Entwicklung eines normalen Verhaltens bei Graupapageien. Es muss daher grosses Gewicht auf die Herkunft und die Aufzuchtmethode der Tiere gelegt werden.

Papageien werden oft routinemässig und systematisch von Hand aufgezogen, um die steigende Nachfrage für Heimtiere zu entsprechen. Die (zu selten gezüchteten) Naturbruten werden in der Regel für die Zucht gebraucht, obwohl sie sehr zahm werden können und weniger Verhaltensauffälligkeiten als Handaufzuchten entwickeln. Der Import von wildgefangenen Graupapageien ist immer noch erlaubt in der Schweiz, trotz der ausreichenden Nachzucht auf nationaler Ebene.

Graupapageien, als sehr empfindliche, soziale und intelligente wilde Lebewesen, zeigen sehr oft Verhaltensprobleme in Gefangenschaft. Ihre Sozial- und Haltungsbedürfnisse werden sehr selten berücksichtigt. Es ist wesentlich, das komplexe Verhalten und die spezifische Sozialbedürfnisse der Papageien besser zu verstehen, da neben dem Interesse für Papageien auch ihre Bedeutung im Heimtiermarkt steigt.

9.3 RÉSUMÉ

L'objectif de l'étude était d'étudier en quoi le comportement de perroquets élevés à la main, ceux élevés en captivité par leurs parents et ceux capturés dans la nature diffère. Par ailleurs, les oiseaux élevés à la main étaient divisés en plusieurs catégories afin d'examiner l'influence des différentes méthodes d'élevage à la main sur leur comportement.

Un questionnaire contenant 138 questions à choix multiples concernant la méthode d'élevage, l'origine, les soins, la détention, la santé, les éventuels anciens propriétaires, le comportement et les interactions sociales des perroquets était rempli chez les propriétaires de 105 perroquets gris du Gabon. Les perroquets étaient âgés au minimum de 3 ans et leur origine était connue ou facilement retraçable. 61 autres réponses ont été données en observant l'oiseau et son environnement. Les éleveurs ont ensuite été contactés pour leur poser 11 questions au sujet de la méthode d'élevage à la main appliquée.

Les résultats ont été analysés statistiquement à l'aide du test khi carré et du test de Fisher (NCSS 2000). Ils ont été basés sur les questions posées aux propriétaires. Plusieurs comportements (par ex. l'agressivité ou la sélectivité) ont été évalués au moyen d'un système prenant en compte de nombreux critères. Toutes les réponses subjectives ont été évaluées et ajustées en utilisant divers critères objectifs.

- **Les perroquets élevés à la main** étaient plus agressifs et plus sélectifs envers les êtres humains que les oiseaux élevés par leurs parents. Les oiseaux élevés à la main qui se piquaient les plumes les rongeaient plutôt que de les arracher. Ceux qui ne montraient pas de picage avaient souvent un plumage excessivement ou alors insuffisamment soigné. En outre, ils étaient moins adroits et montraient un comportement infantile (mendiaient) plus fréquemment que les oiseaux n'ayant pas été élevés à la main.
- Les oisillons élevés à la main qui avaient été gardés **moins de 5 semaines dans le nid** montraient plus fréquemment des mouvements stéréotypés que ceux ayant été nourris plus longtemps par leurs parents.

- Les poussins qui avaient été **nourris au moyen d'une sonde** étaient plus agressifs, criaient plus et étaient dans un moins bon état de santé que ceux ayant été nourris avec une seringue, une pipette ou une cuillère.
- Les oiseaux ayant eu un **contact minimal avec les hommes durant l'élevage à la main** étaient plus aptes à parvenir à se comporter normalement sexuellement avec un congénère que les perroquets qui avaient été constamment en présence de l'homme durant l'élevage à la main.
- Les oisillons qui avaient été **vendus avant d'être indépendants** se lissaient excessivement ou insuffisamment leur plumage comparé à ceux ayant été sevrés chez l'éleveur.
- **Les perroquets capturés dans la nature** se piquaient les plumes plus fréquemment, étaient en moins bonne santé et avaient développé plus fréquemment une peur spécifique comparés aux oiseaux reproduits en captivité.
- De nombreuses constatations concernant **l'influence d'autres facteurs** (tels que la détention ou les soins) sur le comportement des perroquets ont aussi été faites.

Cette étude montre clairement que la méthode d'élevage a une influence sur le comportement des perroquets gris du Gabon. Les perroquets élevés à la main sont tendanciellement plus problématiques que ceux élevés par leurs parents ou capturés à l'état sauvage. Néanmoins, certaines méthodes utilisées pour l'élevage à la main ont moins de conséquences sur le comportement de l'oiseau adulte, comme nourrir les oisillons au moyen d'une cuillère, les garder suffisamment longtemps avec leurs parents ou encore éviter un contact intensif avec les hommes durant l'élevage à la main, et devraient donc être plus fréquemment appliquées. L'imprégnation et les premières interactions sociales des perroquets gris sont cruciales pour le développement normal de leur comportement et ne devraient pas être sous-estimées.

Les perroquets sont souvent élevés à la main systématiquement afin de satisfaire la demande de plus en plus élevée d'animaux de compagnie. Les (trop rares) perroquets élevés par leurs parents en captivité sont généralement utilisés comme animaux reproducteurs, malgré le fait qu'ils puissent devenir très apprivoisés et sont souvent moins problématiques que les oiseaux élevés à la main. L'importation de perroquets gris du Gabon capturés à l'état sauvage est toujours légale en Suisse, malgré le fait que suffisamment d'oiseaux peuvent être élevés en captivité au niveau national.

Les perroquets gris du Gabon, en tant qu'oiseaux sauvages très sensibles, sociaux et intelligents, montrent souvent des troubles de comportement en captivité. Leurs besoins sociaux et environnementaux sont très rarement pris en considération. Il devient essentiel de comprendre les besoins spécifiques et le comportement complexe de ces oiseaux, puisque l'intérêt pour les perroquets ainsi que leur importance sur le marché des animaux de compagnie ne cessent de croître.

10 APPENDIX



Feather picking, stage 2 (wild-caught parrot)



Feather picking, stage 2 (hand-reared parrot)



Feather picking, stage 2



Feather picking, stage 3

Left: feathers plucked (parent-reared parrot) Right: feathers chewed (hand-reared parrot)



Feather picking, stage 4 (wild-caught parrot)



Feather picking, stage 4 (hand-reared parrot)



Feather picking, stage 4 (parent-reared parrot)



Plumage over- or underpreened (hand-reared parrot)



Chick, 5 weeks old



Cage size 1 (40x40x60 cm)



Cage size 2 (60x80x100 cm), "standard" cage size



Cage size 3 (80x120x100 cm)



Aviary size 1 (100x100x200 cm)



Aviary size 2 (100x200x200 cm)



Aviary size 2 (100x200x200 cm)



Bird-room



Bird-tree



Aviary size 3 (bigger than 100x200x200 cm)



Aviary size 3 (bigger than 100x200x200 cm)

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