the fate of these birds in the short term; and in the long term, recommend studies into ***alternative methods of force-feeding.*** All of this, in view of that which has preceded, shows perfectly the contradiction between European laws concerning the protection of animals in factory farming, and the persistence of a practice which neither takes into consideration the physiological or the etological needs of the subjected animals.

6. **Suffering linked to death**

Finally what one takes from them… at the end of the process is their most precious need: life.

INDIVIDUAL AND COLLECTIVE ETHICAL RESPONSIBILITY

The debate concerning foie gras should not be impassioned. It reflects the appropriateness that the whole of society has the right to expect between ethical values, which are posed at a given moment, and their application in all aspects of their activities. In the instance of the production and consumption of foie gras:

If the European Union wishes to conserve current ethical values, the Member States should abide by the recommendations given to them by the reports of experts. Alternative methods of force-feeding must replace current practices.

If certain states continue to produce foie gras, they must clearly state that it is for cultural reasons, and socio-economic ones. All misleading pronouncements should be prohibited in advertising used by the industrial sector to promote its products.

As for the consumers, s/he must be confronted with the implications of their choice. In order to achieve this, it would simply necessitate the labelling of the product and attaching the following statements: "Foie gras is a diseased organ. Its production is in contravention to European Directives concerning the protection of farmed animals."

In Europe, Denmark, Norway, Germany and Poland, have created specific legislation to prohibit force-feeding due to its cruelty to animals; other countries such as England and Switzerland have prohibited its use, using even more wide-ranging legal articles regarding animal cruelty, which concern the non-respect of ethological and physiological needs of animals which are force-fed.

3- Suffering linked directly or indirectly to force-feeding

No animal may be fed in such a way that it results in avoidable suffering or damage, and its food must not contain substances which may result in avoidable suffering or damage. (Title 1 – Art 6)

Foie gras is a diseased organ

3.1 One of the most often advanced arguments from the food production sector is that foie gras cannot be considered a diseased organ because the process of transforming the liver is reversible. We have pointed out on several occasions how this argument is fallacious, and for the following important two reasons:

- The majority of diseases, of whatever kind are reversible, happily enough for the therapists and their disease. The reversibility of lesions does not therefore exclude the fact that it is a disease…

In the case of foie gras, the process becomes irreversible and leads to the death of the ducks when it exceeds a certain threshold.

This is why one finds in the conclusions of the European report the statement that **foie gras must be considered as an organ rendered artificially diseased:** *In conclusion, there is sufficient proof to show that the structure as much as the hepatic function is seriously altered and modified in force-fed geese*. This degeneration of the liver orchestrated methodically by man on a living animal is directly and indirectly the source of **suffering** according to many scientists.

Force-feeding

3.2 The report by the European Union insists again on the fact that: *"the traditional methods of force-feeding have been dramatically modified during the last thirty years in order to rationalise and industrialise production in order to increase profits. This has resulted in a direct impact on the species submitted to the process and in the conditions of their detention and the composition of the foodstuff which they are given to consume. These modifications have been made* ***without any consideration*** *for the well-being of the animal. It is obvious that not only have the conditions towards their well-being not been improved, but that on the contrary, they have deteriorated"*.

It should be noted that placing an oesophagus probe into domestic species is forbidden whatever species is under consideration except for palmipeds…for which an exception has been made on cultural grounds.

The only justification which the European Union accords to force-feeding is…**socio-economic reasons**. For the rest *"the scientific community suggests initiatives to improve*

AFTERWORD BY DR Y BECK

Physiological and ethological suffering

All animals must be provided with housing, food and care that is appropriate for its species, its stage of development, adaptability or domestication, acknowledging its physiological and ethological needs conforming to acquired experience and scientific knowledge.

(Titre 1- Art 3)

The food given to palmipeds does not cover the physiological needs of this species. It is an unbalanced diet, designed to artificially cause hepatic lipidosis.

Given the fact that in the wild, the birds have refused to eat it.

Given the fact that if it were given in normal quantities the birds would not survive long term with the deficiencies it would cause.

2.2 The techniques of factory farming do not respect the ethological needs of the species concerned. For example, ducks and geese are aquatic species. If we just consider this one aspect, - can we really imagine that suspending a pipette above the birds so that water could land drop by drop onto their heads while they are enclosed in individual cages would ever replace access to a pond, which they have the right to aspire to … seeing as they are an aquatic species?

2- Suffering linked to factory farming conditions

Freedom of movement attributed to the animal, taking into account its species and conforming to acquired experience and scientific knowledge, must not be hampered so much that it is at risk of avoidable suffering or damage.
(Title 1 - Art 4-para 1)

Foie gras is presented as a natural product. A regional product, part of a long tradition. The reality of the facts is completely different. There is no longer any common link between what goes on in the wild, what was carried out in times gone by, and the unrestrained industrialisation in which we take part today: 80% of force-fed ducks are in individual cages 20-21cm in width by 45-50 length and 27-33 height (a shoe box in which they can barely turn around). Can this be considered as respect for the freedom of movement of this species?

The construction of new battery installations has been forbidden in Europe since 1st January 2003. The existing installations must disappear by 1st January 2012 and be replaced by alternative systems.

General Conclusions

Ethological expertise certainly cannot allow the attestation, as one often hears, that before the force-feeding period the ducks are maintained in breeding conditions which assures them a maximum of well-being. On the other hand, there is no doubt that force-feeding subjects the ducks to physiological and behavioural suffering which dramatically reduces their well-being. This is why it seems untenable for us to attest that these animals would not produce foie gras (in such quantity) if they were maltreated. On the contrary, force-feeding seems to constitute a practice which is criticised ethically.

ducklings in the factory of the force feeder itself, but when you understand the problems of this imprinting it is better to avoid this emotional conflict. In fact the ducklings would be even more impregnated to the breeders who they would see during the critical period of filial response towards "animal-parents" (13^{th}-16^{th} hour after birth).

Suffering caused by the force-feeding procedures

The pain

It may occur if the sensory receptors called nociceptors of the mouth and the gullet (nervous fibres Aδ & C) are stimulated too intensively by the instrument used to force-feed (solid or flexible tube or funnel) and by food which is too hot. At the same time increase of the rate of dilatation of the liver (up to 7-9 times its normal volume) exerts pressure on the abdomen and the lungs. Poultry does not have a diaphram the pain receptors are (amongst others) localised under the intestinal mucus membrane with the muscles of the intenstine (C fibres in particular). The repetitive contact with the grill of the cages induces deplumage and lesions on the neck, throat, chest and the wings (above all with the most agitated animals).

Hepatic Encephalopathy

Ammonium and other substances which are insufficiently eliminated attack the central nervous system and produce behavioural problems (motor stereotypes, ataxia, immobility and apathy).

Stress (physiology)

The repeated perturbations of the environment imposed on the animal excessive adaptation mechanisms which end by being damaging for the health. In poultry, a prolonged state of stress ensues, after the activation of the medullosurrenales (which secrete adrenalin and noradrenalin) an activation of the corticosurrenales, which secrete the corticosteriodienne hormones. The specific stress is accompanied by an acceleration in the cardiac rhythm and motor responses associated with stress (flight above all, which is impossible in force-feeding cages). The chronic stress which is accompanied by a decrease in immune defence and precedes several pathologies (cardiac, gastro-interitis) often even death in the case of domestic poultry destined for production. One knows, for example, that the manipulations and other human actions cause an intense physiological stress in hens and chickens. There is no doubt that when the force-feeder grabs the ducks by the head or the neck to force it to open its beak the animals react strongly and then show after force-feeding, pathological behaviour called motor stereotypes (such that the fact of turning around in a confined cage and moving the head). Other stress factors, shown experimentally, are caused by the transport by lorry and by train, of one day old ducklings, as well as the deprivation of food which precedes the journey. The repeated stress which the ducks are subjected to, explains the high rate of mortality of between 4 and 10% which are confirmed (officially) up to slaughter.

6. Deprivation of social needs

All gregarious species search for contact with fellow creatures from birth and look to form stable groups where individual recognition makes cooperation prevails over competition, notably of the aggressive type.

Well, ducks are most often confined individually in cages with grills (15cm x 25 cm); this partial isolation produces a separation which frustrates the animal from having normal affiliative relations with its fellow creatures (visible to him) and which is expressed in activities such as mutual grooming.

In addition, females are excluded from the battery so that the males are deprived of sexual relations, which are in general preferentially expressed in paired reproducing couples. Such frustration (demonstrated in the inverse case with laying hens) is the cause of social stress.

However the worst suffering in terms of social needs resides in the abusive use of the ethological process of filial impregnation extremely characteristic of ducks and geese. One should be honest and make it clear that, it appears that this use is not at all intentional by the foie gras producers, who are not aware of it and should be enlightened on this point.

The ducks have a genetic predisposition to follow the first object which they see move in front of it after birth; they learn the morphological characteristics of this first encountered parent and attach themselves to it in an almost irreversible way until sexual maturity. This filial impregnation is addressed towards humans if the latter are the first "animal parents" which the duckling sees during the 3 first days after birth (especially during the 5^{th}-24^{th} hour) and we know that the ducklings arrive at the factory to be fattened at a day old, when they are not born at the force-feeders itself. The duckling will prefer to follow, often even exclusively, the humans who give them heating (artificial), protection, and food, this affective dependence can last 30 days. It is such an attachment which explains the approachable response towards the breeders who feed them and who believe in good faith, that the ducks are "gluttons" to the point of subsequently easily accepting to be force-fed. In any event, this positive response towards humans facililtates pre-force-feeding during which the animals swallow 220g of food a day by themselves, which still constitutes a reasonable quantity for a (docile!) duck. But then, we know that the ducks show a flight response when the increasing quantity of the food becomes associated with manipulations imposed by the force-feeder. The force feeder has to sometimes pursue and catch the animals, or at the very least restrain them manually to prevent their flight, in such a way that the animals are going to suffer an intense emotional conflict between their tendency to be social towards humans and their tendency towards mistrust then of fear towards the force-feeder. This anxiety will increase with the repetition of the cause of the stress and the pain associated with the procedure of force-feeding. Even the most well-intentioned force-feeders will only maintain this emotional problem by excessive amounts of caresses after each force-feed, which reinforces the emotional relationship. To avoid the stress of transporting the ducks, some have advocated producing the

2. Overpopulation

In the "collective parks" or "force-feeding parks" 15-18 animals are heaped up into boxes +/- 3m2 with a ground area (intermediary type) (1600-200 cm2 by animal which are known to cause pecking from aggressive beaks and cannibalism (this is the reason for debeaking in duck collective parks for meat production.

3. Absence of Water

Even for animals raised outside before the force-feeding period it is impossible for them to swim or clean their plumage, which remains dehydrated because the natural lubrication of the feathers cannot take place.

4. Passive Eating and Drinking

By definition, force-feeding consists of fattening the animal by force. In addition to the fact that the animal can no longer look for and eat food spontaneoudly. It is deprived of the need (demonstrated experimentally) to dedicate at least 35% of its ration of industrial flour to the active search for food. All the same the fact of mixing the corn power with water constitutes a passive feeding process which deprives the duck of the need to drink whilst eating.

5. Deprivation of Physiological Needs

Food (cooked salted powdered corn mixed with water) constitutes a scarcely balanced food serving to cause and maintain a hypertrophic process of fatty liver cells (adipose). The ducks cannot eat spontaneously and above all they do not consume such a large quantity as 400-500 grams each day in the wild. Hyperplaegia, does not correspond to a natural need, contrary to the argument according to which migratory birds, such as ducks, accumulate fat around the liver (without taking into account the fact that domestic ducks are never confronted with very low temperatures nor to periods of penury which wild migratory birds of their species encounter). Nor can an argument be made from the fact that "pre-force-fed" the animals can swallow the food themselves, on the one hand, the animals receive a reasonable quantity of food (220g a day) and, on the other hand, this "pre-force-feeding" is applied precisely to allow the animal to get used to excessive quantities of food. In short, autoforce-feeding does not exist in ducks in their natural state and, if hyperplaegia is observed in a duck in daily life, it is always pathological behaviour, symptomatic of physical and social stress. In no case no-one can affirm that force-feeding satisfies in a maximum way a visceral or basic physiological need, in as much as the need for food in an animal is accompanied by a choice, spontaneous or learned, and an active search of adequate food for the maintenance of health.

ETHOLOGICAL EXPERTISE CONCERNING FORCE-FEEDING DUCKS
Professor René Zayan

A vet is competent to show that force-feeding the liver makes animals sick.

An ethologist, i.e. a specialist in animal behaviour, is competent to show that force-feeding causes suffering. The ethologist demonstrates this not on species in the wild, but directly, in scientific research, conducted on domestic animals and more particularly on species or breeds raised for production such as laying chickens. In addition, experimental research in animal psychology allows one to get to know the motivations, emotions, perceptions and the mental representations in higher vertebrates (birds and mammals).

Suffering corresponds to a critical reduction (either signficative or a fortiori, important) of a subjective state of the animal which one calls its degree of well-being. Their well-being results in a relative and temporary satisfaction of a certain number of basic needs. The latter are defined by the genetic predispositions in the physical and social environment. Elements capable of assuring the biological viability of the animal, its survival, but also its health, growth and reproduction. The genetic programming of the species or domestic breeds determine its needs which would be present, or on the contrary not present, in the artificial environment of captivity; the former conditions may be damaging, but a human being may also do its best for the animal with regard to the conditions of well-being that the animal looks for since his birth.

Therefore, the suffering of an animal results in the objective fact that one or other of its basic needs are insufficiently met or a fortiori, completely unsatisfactory. But in addition, animal suffering will be caused specifically, by the stimuli of the environment exercising a detrimental effect on the capacity of the animal to cope, notably by stimuli caused by pain and from stress.

Deprivation of behavioural needs (ethological)

Ducks, like all the laying chickens, have a genetic programme of natural activities which they must be able to carry out within their captive environment, above all during the period just after birth. The conditions of accommodation during force-feeding are incompatible with well-being, for the following characteristic reasons.

1. Confinement

In the battery cages on grating for ducks and in the more intensive systems the area of ground per animal (<375cm2) is even less than that for laying hens (500 cm2), whilst it has been shown that they require at least 900 cm2 per animal in battery cages. The animals cannot move about normally and they are aggravated or hurt by the grills (notably when the neck, progressively deplumed, goes outside of the cage). When they become too large, the animals can even put their head outside of the cage. Obviously it is out of the question that the birds can fly, they can barely move.

maximum of well-being. On the other hand, there is absolutely no doubt, that force-feeding subjects them to physiological and behavioural suffering which dramatically reduces their well-being. This is why the assertion that these animals would not produce foie gras (and in such quantity) if they were maltreated seems to us, untenable. On the contrary, force-feeding constitutes a reprehensible practice from an ethical point of view.

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In the light of this knowledge, the article published by INRA (Institut National de la Recherche Agronomique) which attempts to show the variation in the state of stress of palmipeds according to different types of contention, appears to be scientific imposture, as an absurd example of the mis-use of the rigour of the scientific method.

The form is superb but it is fundamentally biased.

The protocol used may give information on the stressed state of the animals but this is in no way significative of the state of well-being of the animals.

If it is admitted scientifically that the increase of cortisol in the blood or urine is increased in the case of extreme stress and even 'chronic' in cats for example, the possible absence of this increase would in itself not serve as an argument to prove the well-being of the animal in question.

Nowadays the behavioural dimension is no longer ignored, and at this moment, conscientious biologists concerned about objectivity are attempting to establish in cats (whose well-being or not does not have many financial or economic implications) a correlation between the possible changes in the blood and changes in behaviour in order to validate the blood dosages, which may perhaps, one day, allow a quantitative and easy evaluation of well-being. But this has yet to be proved.

In addition the comparative study by INRA is likely to be scientifically incorrect in another way: all force-fed ducks – the conditions being abnormally constricting for a duck – are likely to present suprarenal exhaustion rendering them incapable of reacting to added stress – hence from there a lack of reliability. It would admit to prove that these ducks did not have a suprarenal reactivity less than the ducks raised in conditions which respected their behavioural needs.

Adding to this the criticism that the notion of well-being would only respond to a dynamic analysis. In this way one could be a manic depressive and only be completely stressed in a manic phase. Here this shows again the limits of specific physiological analysis; some neurological disturbances develop in phases over a period of time. In the same way if one photographs a force-fed duck as it carried out stereotypical behaviour, it would appear normal when it is not the case.

Only a sequential and ethological approach takes into account the temporal and dynamic dimension in its evaluation of well-being.

In conclusion, at the risk of sounding tautological, the evaluation of an animal's well-being must take ethological analysis into consideration.

Ethological expertise certainly does not affirm, as one often hears, that before the period of force-feeding the ducks are maintained in farming conditions which assure them a

2nd Consumption phase

3rd Appeasement phase

(Ex: regarding feeding behaviour: One is hungry, one eats, one is satiated).

During actual pathological behaviour, this sequence is generally modified. Often the 3rd phase disappears (responsible for an end of the behaviour by a kind of retro-control) then of the first (or occasionally a sequential disorganisation emerging on repetitive behaviour). Substitute activities are already part of the manifestations of anxiety as much as pathology. Behaviour is considered pathological as soon as the animal is incapable of adapting to changes in its environment. I quote Pageat: "We define anxiety as a reactionary state characterised by an increase in the probability of triggering an emotional reaction analogous to that of fear in response to any variation in environment. It is the result of a disorganisation of autocontrols". With dogs, for example, this process of inflexibility in behavioural responses is studied at the moment by means of very specific comparative medical tests in order to show which neurotransmitters are involved in which function. Pageat attempted to show that a progressive evolution exists over time between different pathological behaviour tables, each defined by him as being characterised by the involvement of certain precise neurotransmitters, proof being that the way such or such medicine works in curing a problem is specific and well-known. The constant for all these tables, that the spontaneously observed cure rate is very slight without treatment.

It would appear that substitution[2] activities may lead to stereotypical behaviour in dogs over time.

Within a thought system, which likes to think it is valid for all species, such as anxiety as much as the presence of stereotypic EST, a pathological system which is truly characterised by subtle neuro-physiological changes are difficult to study directly. (Tomography positron emissions).

On the other hand, evidence on the constraints which force-feeding exerts on palmipeds with regard to execution of their behavioural repertoire are described logically and point by point by Professor R. Zayan in his capacity as ethological expert. The harmful constraints (put in a cage, separation from the 'mother') have an effect on behaviour which has been proved for a long time as innate and irreversible, such as imprinting (the recognition of the first object seen as being the mother) which may be easily manipulated for profitable ends, but which are intolerable for the animals' well-being.

Equally, the manifestation in ducks of hyper-aggression and cannibalism due to the high density of the population per m2 are symptoms of stress know for a long time for their implications for productivity for breeders (decrease in profitability).

[2] normal in a species but repeated abnormally, frequently to resolve internal conflict such as scratching the chin in humans or licking for dogs

Ethological Report

Dr C. Van Berchem

And

Etological Expert
Professor R Zayan

In an era of neuro-psycho-physiology, it seems absurd to only take blood physiology as the sole criterium in evaluating well-being. It is unanimously recognised today, in other species, that certain abnormal behaviour such as stereotypes, hyper-aggression, pathologies, are proof of mental suffering, and could be the consequence of difficulties in handling certain exterior constraints, and are a reflection of a progressive disturbance of neurotransmitters. It should be agreed, therefore, that a correlation be made between blood and ethological evaluations, before coming to conclusions about well-being solely from blood analysis.

In addition ethology has an advantage by taking into account temporal and dynamic dimensions in the notion of well-being, which selective blood tests do not take into account. Consistent with the observation of the development of behaviour, it does not interfere with the conditions of the experiments, whilst the manipulations to achieve blood samples constitute (in the case where the aim is the evaluation of stress) interference with experimental conditions.

The presence of anxiety, stereotypes of hyper-aggression, are signs of behavioural pathology which show an absence of well-being[1]

Let us remember the universal definition of health by Hippocrates: health is not just an absence of sickness but a state of physical and mental well-being.

It is commonly agreed, as much by psychiatrists of whatever school, and by ethologists, that the presence of gratuitous behaviour, abnormal/frequently repetitive and deviant, is a sign of behavioural pathology.

Veterinaries of the French School of Animal Psychology have an ethological approach to behaviour which is based on a sequential analysis of different behaviours proper to a species, that is: in all species all normal behaviour may be divided into 3 phases:

1st Appetite phase

[1] act repeated regularly without reason

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3. Intestinal indigestion: appears in over fed animals, living completely in the inside without exercise. It appears as a problem of transit which may lead to a complete intestinal obstruction, by the formation of balls of excrement in the intestine.

Hypoglycemic coma
Fibrosis of the liver

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a massive amount of glucides which surpaces the enzymes capacity of the digestive tract, to which may be added digestive atony due to acidosis. The abuse of antibiotics at the beginning of force-feeding and the emergence of candida are also cited. This table may also be the source of horrible deaths by septicaemia or enterotoxaemia.

2. Chronic enteritis

Acute enteritis may follow or develop straight away.

c-2 Enterotoxaemia caused by force feeding or green diarrhoea.

It appears after the first fortnight of force-feeding and is associated with digestive problems (gastro-enteritis) and nervous problems (convulsions) and then sudden death.
Source: - either a toxic infection due to anerobic germs (Clostridium perfringens)
- or a proliferation of acidophiles germs (Colibaciles) which produce a large quantity of toxins responsible for the death of the sick animals (22 page 42). It is important to underline that a high proportion of geese and ducks have enterotoxaemia within the first two weeks of force-feeding. They get better after adequate antibiotic treatment which raises the question of the permanence of the residues left in meat delivered for consumption.

c-3Respiratory diseases (28 page 43)

"…these problems greatly concern the force-feeding of ducks and in particular geese because of their frequency and their seriousness at this present time…"

They manifest as lesions to the aerosacculite, pericardite and peri-hepatititis. They are due to the interaction of several factors such as:

First endemics of aerosacculite in factory farms (bacteria and mycoplasms)
Stress and bad hygiene during force-feeding
Source of lowering of productivity (slowing down of fattening process) indeed of mortality.

c-4 Cholera (Pasteurella multicoda)

Cholera epidemics can also re-emerge during force-feeding, in contaminated or insufficiently immunised gaggles/herds (vaccination should be carried out in factory farms and a booster three weeks before force-feeding begins.

c-5 Other non-infectious complications of the digestive tract are cited- to recap:

1. "Engouement" stenosis: of the oesophagus after a bout of oesophagitis.
2. Tympanitis: indigestion, leading to a large production of gas due to fermentation in the crop.

c) The parasites in the environment (pressure of infection) which play a determining role in the intensive farms which provide force-fed birds.

All of these factors act alone or in association with stressed or weakened animals, produce the ideal hatching conditions for infections which come from parasites, bacteria or fungus, which are then grouped into the global definition “germes de sortie” infection due to depression of immune system.

Parasites (intestinal vermin)

It should be emphasized that all parasites encountered in adult palmipeds are found during force-feeding; it is therefore indispensable to respect the prophylactic methods put in place in battery farms and to establish a control process (parasitic contamination) before accepting the birds for force-feeding.

Notably one should check:
Oesophagus-crop: capillaries (rare)
Gullet and proventricule:

a) amidomostome: the most frequent parasite and the most dangerous: hematophage: this causes the appearance of a table of dysphagia, anaemia, weight loss and death. Infestation is very often unnoticeable at first, the problems appear only at the beginning of force-feeding by overloading of the anterior parts of the digestive tract.
b) Epomidiostome
c) Spirures

Fungal Infections

Candida or thrush principally attacks the oesophagus and the crop. This is a disease which is becoming more and more frequent. Candida albicans is an opportunist which takes advantage of any kind of lesion of the oesophagus or weakness in general health to spread (following changes to rations, hormonal climate, therapy using antiobiotics.

Bacterial Infections

These are the source of four important complications.

c-1 Enteritus

Acute enteritus of the small intestine or force-feeding enteritus is characterised by a syndrome of paresis, desperate thirst, immobility and diarrhoea

Source: a number of causes are cited which predispose the animals to this infection, climatic conditions (excessive temperature, humidity, ventilation…) and over-feeding. Force-feeding unbalances the intestinal flora (appearance of germs which produce toxins)

3. Lesions caused directly by force-feeding

a) Injury to the neck or crop (1-2-22-28)

This ailment is revealed in two clinical forms:
Firstly: high location – (oedema and peri-pharyngeal inflammation) resulting from too brutal introduction of the end of the instrument by the force feeder;
Second: low location (the inclined part of the oesophagus and the proventricule) is a septic necrosis resulting from micro trauma or a perforation of the oesophagus during the passage of the instrument (inflammation of the oesophagus). It is often aggravated by the manipulations of the force feeder who wants to speed up the descent of the corn into the dilated oesophagus by a too rapid mass of grains. Burning of the corn, or the defensive actions of the bird also figure among the determining causes.

b) Asphyxiation due to incorrect swallowing (or error in placing) i.e. accidental entry of the corn into the trachea during force-feeding.

c) Nevroses at the end of force-feeding

These are characterised by convulsions followed by the sudden death of the animals, due to a hypoglyceamic crisis. They appear most often following an interruption in the distribution of food during force-feeding (for example, no food on Sundays).

d) Sudden death by hepatic haemorrage, following the rupture of Glisson's capsule (which surrounds the liver) due to the effects of stress or crushing within the gaggle.

e) Other accidents may also be brought about notably due to bad conditions of confinement: wounds to feet on the grid, anoxia due to bad ventilation or over-population…

3.2 Diseases indirectly induced by force-feeding

Changes in the mode or type of feeding, puts an enormous stress on the organism. Secondary infections germs caught due to immuno-depression. The price to pay for growth in productivity. Three factors come into play:

a) The general conditions of factory farming which group a number of factors acting in synergy, such as density of population, hygienic conditions (temperature and ventilation of the premises, disinfection…) the stress to which the animals are subjected etc…

b) The brutal change in the type of food: the change from a habitual diet to one of an unbalanced and considerably enriched one, deeply disturbs the birds' intestinal flora and digestion.

short-chain fatty acid) which may reach the central nervous system (particularly sensitive to these components) which then cause problems for the central nervous system such as:
Circling movement
Epileptiform crises
Phenomenon of increase in intra-cranium pressure accompanied by migraines…
And finally stupor, coma and death.

2.5 Hepatic insufficiency

In addition to hepatatic lesions or peri-hepatitis already described, steatosis is part of a global pathological process of which the final stage, steatonecrosis is irreversible, and leads to death of the individual due to hepatic insufficiency.

Numerous studies carried out by veterinary services interested by this type of production (service of hygiene of veterinary foodstuffs ENVT: 21-36-37, service of biochemical and metabolic toxology ENVT: 16, animal biology and poultry science (Veterinary University, Jerusalem: 17) as well as doctoral theses of veterinary doctors (21-28-36-37) show notably:
The presence of hepatic function during and at the end of force-feeding
The presence of biochemical changes associated with these hepatic disfunctions
The type of hepatic pathology concerned

These prove that force-fed animals develop at different degrees, according to their sensitivity, the hepatic pathologies induced by steatosis. This can not be considered as a physiologically normal process, steatosis of the liver is certainly a pathological liver.

At the end of its development, the global incapacity of the organ to maintain its metabolic functions, shows itself according to a clinical table which is very diversified associated or not with metabolic problems of glucides, lipids, proteins, water, problems with coagulation, secretory problems (gastroenteritis, icterus…) …anaemia…
At these stages, the steatonecrosis lesions are generally irreversible and condemn the ill animal.

3. Extra-hepatic ailments caused directly or indirectly by the practice of force-feeding

We have illustrated the different pathologies induced by force-feeding of the liver. Other extra-hepatic complications this time are associated with this practice either
Directly: these are essentially trauma during handling caused by the end of the force-feeding instrument, the handler in (massaging the neck) or by the foodstuff (too hot);
Indirectly: they regroup a number of factors in close interaction, in which the feeding and breeding conditions play an essential role.

2.2 Hepatic lesions encountered during necropsic examination

a. Perihepatitis (21-36)

"…inspection of palmidped livers in the evisceration rooms and abattoirs has shown a notably frequency of lesions of a perihepatitis type. Several macroscopic and histological aspects are described and consequences for their health are considered."

In conclusion, the result of this study shows that the lesions of perihepatitis are the result of inflammatory phenomenon connected to:
Frequency of suffering of respiratory sacs
More rarely, a perforation of the oesophagus during manipulation
Finally, a circulatory deficiency which could be the result of pulmonary problems.
Superficial lesions in the beginning (Glisson capsule) can nevertheless have profound repercussions on the liver (not deemed suitable for consumption)

b. Necrosis (21-37)

"…after having recalled the different kinds of necrosis observed in the liver, the authors present a series of cases taken from the livers of fat palmipeds, during their preparation in the abattoir and evisceration rooms…"

Three hypotheses are deduced as regards etiology of lesions in evidence:
1 an infectious origin source being respiratory or digestive
2 toxic origin consequence of either absorption of mycotoxins in bad quality corn, or unbalanced nutrition in individuals badly prepared for force-feeding
3 circulatory origin, consequence of tissue anoxia on the livers at the end of force-feeding.

2.3 Circulatory Problems

Changes brought about by steatosis to the hepatic structure are a source of a hypertension of the circulatory system, the consequences of which are multiple:
During autopsy the animals show signs of"
Ascites liquid in the abdomen (21-36-37)
Splenomegaly
Heart or kidney insufficiency
These different pathologies may appear on their own or in combination with each other.

2.4 Encephalo-hepatitis

This ailment is the result of an endogenous intoxication due to suffering of the liver, the liver can no longer play its role as circulatory filter. This results in the appearance different metabolites in the blood normally stopped by the liver (ammonium, mercaptans,

2. Hepatic steatosis: synoptic table of hepatic ailments

As illustrated on the previous page, steatosis is the intermediary stage of a general process of fatty overload of the liver, of which the final stage is degeneration or steatonenecrosis. It is up to everyone, according to his sensitivity, or training (clinician, pathologist, biochemist) to fix the threshold which separates overload and degeneration at the cellular level and the implications of this for animal suffering. This threshold determines largely the moment the palmipeds will be slaughtered at the end of the fattening period.

The clinical description of the animals at this point is illustrated by Dr Castets, in his thesis presented to the ENVT (Ecole National Veterinaire Toulouse) in 1979 (28):

These animals at the end of force-feeding show:
a great increase in weight (which can double)
paleness of the skin and mucus membranes
a coat stuck by a coating of fat
difficulties in walking, a large abdominal ptosis (heavy abdomen) and dyspnea (panting breath)
…"if the force-feeding continues, the animals lie down, with no energy left, asphyxiate and die…"

Hepatic ailments linked to steatosis are repeated below:

1 hepatomegaly
2 hepatic lesions encountered during necroscopic examination of force-fed animals
2a perihepatitus
2b hepatic necrosis
3 circulatory problems associated with portal hypertension
4 encephalo-hepatitis
5 overall insufficiency of the liver

2.1 Hepatomegaly

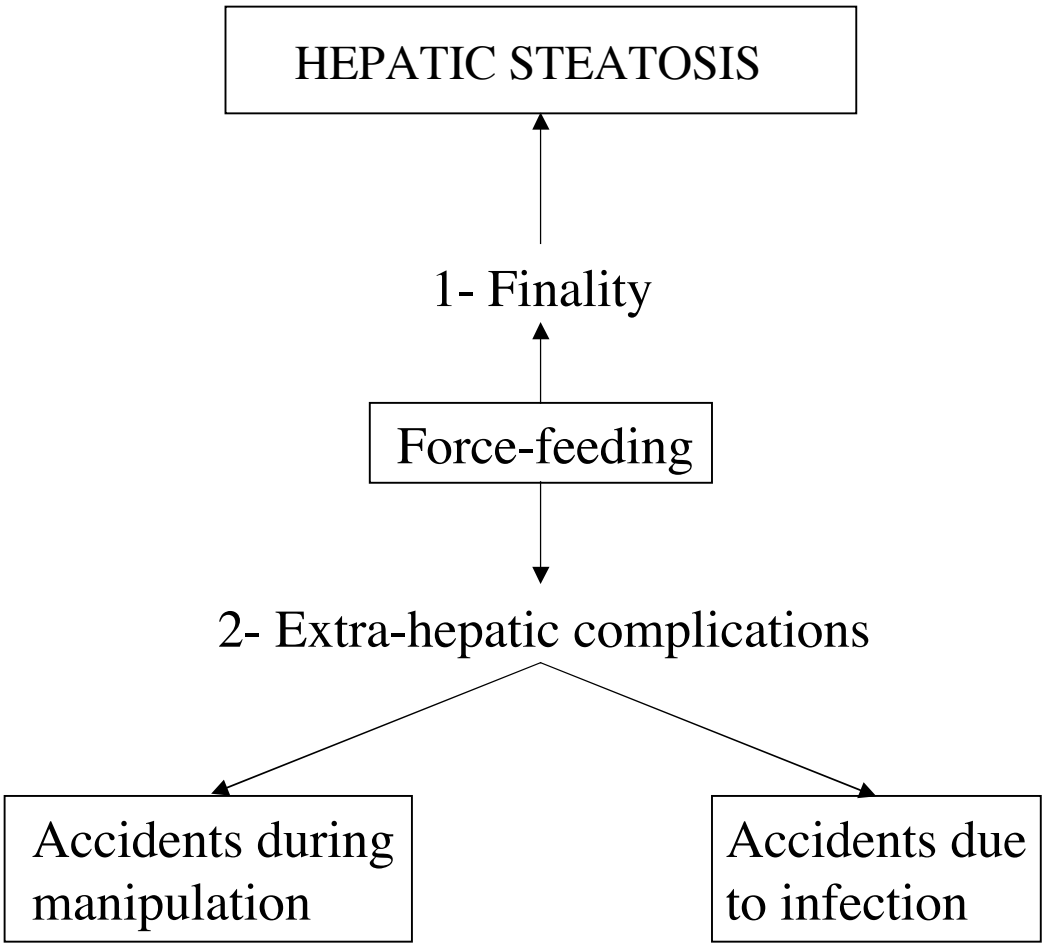
This concerns an increase in the volume of the liver provoked in this particular case, by the accumulation of fats in the hepatic cells during the steotosis process. The repercussions of hepatomegaly on the general state of health are essentially 'mechanic' and include:
Heaviness and abdominal ptosis
Problems in walking
Respiratory problems (due to compression of air sacks) accentuated by the absence of a diaphragm in birds.

This hepatomegaly is especially accentuated in ducks from the 10^{th} day of force-feeding, and accelerates during the last third period of fattening (21 page 57)

Report on diseases whose origin is caused directly or indirectly by the practice of force-feeding.

Dr Y Beck

Hepatic Steatosis: Synoptic Table of hepatic ailments
Schema 12



*** Activités dans les médias***

de 1986 ai 990: Vétérinaire et présentateur de l'émission télévisée journalière "Poils et Plumes" sur RTL devenue Tv team à Bruxelles.

**** Activités associatives***

- /10/1993: Délégué Permanent pour le Comité Anti-Fourrure au sein de Institut Belge de Normalisation (29 av de la Brabançonne 1040 Bruxelles. tel 734 92 05) – Expert scientifique au sein de la délégation belge de I'IBN à Utrecht (1994>, Denver (1995 et Londres (1996)

- Depuis janvier 1996 Président de l'asbl R.N.S - Planète Vie (Rassemblement pour une Nouvelle Société - mouvement de protection animale et de sauvegarde de la nature) fondée en 1984 par le sénateur R. Gillet - siège social et secrétariat:123 rue Edith Cavell 1180 Bruxelles

- Depuis 2001 Administrateur et Membre fondateur de la Maison de l'Eau et de la Vie, 171/3 rue Royale 1210 Bruxelles : responsable du Centre d'Ethique

**** Publications***

- Rédaction du *Biorim Vet News* distribué aux Vétérinaires jusqu'en 1992
- co-Rédacteur du *V-Iab News* distribué aux Vétérinaires

Sujets traités: actualités en biologie clinique vétérinaire

- Le Monde Vétérinaire:

1- Biologie Clinique et Hypercorticisme:1991
2- Biologie Clinique et Hypothyroidie: n~35 02/92
3- Syndrome Mal-Absorption Mal-Digestion : n^0 37 09/92

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- L'Animal L'Homme La Vie, trouver le sens ; éditions les Eperonniers ; 1998
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Etudes

- 1981 *Université de Liége: Faculté de Médecine Vétérinaire:* 3ème doctorat mention distinction.

-1993 Université Libre de Bruxelles:
Licence Spéciale interfacultaire en Environnement:
3ème cycle organisé par la faculté des Sciences:
mention Grande Distinction.

Activités professionnelles

* ***Praticien*** en Médecine des Petits Animaux depuis 1981 dans un cabinet vétérinaire
situé au 123 rue ECavelI 1180 Bruxelles - Belgique.

* ***Activités en biologie clinique vétérinaire:***

-1982: Création et Responsable du Département de Biologie Clinique des Petits Animaux: laboratoire LAMA (rue du Sillon 1070 Bruxelles)

-1985: Création Département de Diagnostic des Maladies Virales des Carnivores Domestiques en collaboration avec le Service de Virologie et de Pathologie des maladies virales de l'Université d'Etat de Liège. Depuis lors statut de collaborateur au sein de cette université.

- Fusion du LAMA et de BIORIM. Responsable du Département de Biologie Clinique Vétérinaire du laboratoire Biorim (chée de Charlero 1060 Bruxel les) jusqu'en 09/92.

-1992: Fusion Biorim et V-I ab. Co-responsable du département vétérinaire de V-lab (av de Sellier de Moranville 86 1080 Bxl tel : 468 2322), puis consultant pour V-lab.

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Ake Lidstrom introductory paper no. 44 Dept of Ecology, Lund University 1986

as they wanted and produce a fattier liver than normal. This is, after all, the origin of this traditional product.

respiratory difficulties, which have still not yet been detected because the animals, shut into narrow cages, cannot make any muscular effort, and above all have enormous difficulties in controlling their temperature. There is also vessel compression which develops into circulatory problems.

Apart from these facts, we are in the presence of animals which have been made extremely fragile, very sensitive to stress, changes in the environment, and to infections.

This problem with infections, described by dr Yvan Beck (see report) leads to the use, as much as a proplylaxis as a treatment, of antibiotics and other medicines. This raises another important problem for public health, that of **residue of medicines.** In fact if the studies had been carried out on the metabolism of medicines on healthy animals, no one would have been able to affirm that, the catabolic potential of ducks and geese would not be disturbed by force-feeding, and that the residues are eliminated before the end of force-feeding. There is therefore a risk of residues in the muscles and the liver.

Some pathologies which resurface in defence of force-feeding (ex **cholera**) are difficult to diagnose histologically given the modifications which have already been provoked by fattening, only the isolation of the pasteurella in the blood and the bone marrow of cadavers may allow such diagnosis. This is not done systematically.

In conclusion

The excessive lipid load observed in the livers of ducks and geese at the end of force-feeding is, from the anatomopathological point of view, a lesion, and not part of the normal physiological process. The lesional character of these alterations is also confirmed by the changes in clinical biology (increase of hepatic enzymes in the blood etc). In no instance, can this increase be considered normal. It is a categoric sign of a diseased state and a clinical symptom (difficulty in breathing, difficulties in regulating their temperature, exhaustion, difficulties in making an effort etc.) Therefore one is not making use of a natural physiological process in palmipeds to produce a delicacy but rather a pathological process, which can be reproduced in certain species. If the liver of a goose or a duck is used, it is because the pathology is easier to reproduce.

In addition to the lesions caused directly by force-feeding, the immune system as well as the liver is rendered frail to cope with any stress to which the animal is subjected.

The animal therefore often develops infections, which can be combated by the use of antibiotics. This however, poses the very important problem of having residues of antibiotics within food destined for human consumption.

I acknowledge that foie gras whilst being a completely unnecessary food for man, is a highly appreciated delicacy. Nevertheless, the means of obtaining this delicacy, and the money which it fetches, above all for a minority, does not justify the extremely painful conditions in which this food is produced. An alternative could be found, this time only using the physiological capacity of the animal. In fact, they could willingly eat as much

recognise the lobular organisation of the liver. Large-size enclaves appear. The cellular membrane is still well conserved (weight 490gr).

By day 12, the lipid enclaves have become even bigger, the previous microvacuoles have fused to make the enclaves which occupy the largest part of the cytoplasm. The amount of fats reaches 42% and the total soluble sugars 1.84%.

By day 15, the fatty overload is complete and homogenous in all the cells. The hepatocyte is engorged with fat however it remains a fine cytoplasmic network, which gives the appearance of being slightly grainy (weight 610gr).

By day 18, the amount of fat reaches 50-60% and the amount of total soluble sugars 1.16-0% (the weight of the liver can go from 6-1000gr or 6-10 times more than the initial size).

In these livers, one sometimes notices ruptured membranes. These cells are very distended.

If the force-feeding continues necrosis will develop.

For the Barbary duck, one can observe a relatively identical evolution. The liver goes from day 2 at more or less 70-80 gr to reach a weight of 500 to 600 gr by day 14.

By day 12 the hepatocytes are described as having transformed into enormous fatty vesicles with some cells having ruptured membranes and a coalescence of fatty vacuoles. The comparison with the fatty overload in the liver of geese and ducks shows that the geese keep the small liposomes limited by a fine net of protoplasm much later, whilst in the Barbary duck the lipids accumulate rapidly in the form of wide valuoles which very quickly occupy the totality of the cell.

Sometimes this membrane ruptures and the lipid enclaves of several adjacent cells converge in a more or less voluminous mass whose polycyclic contours are formed by the fragments of cellular membranes. This type of change is linked to the state of macrovacuolar overload. From a pathological point of view, this type of lesion is also found in different hepatic diseases and is the blatant histological sign of a hepatic disease.

In the histological description we can see that in the case of force-feeding this physiological capacity is greatly exceeded and one is faced with actual fatty degeneration. Different factors allow us to evaluate the exact cellular suffering (clinical biology) and the animal suffering (symptomatology).

In addition the metabolic effects directly connected to the accumulation of these lipids, bring about mechanical problems:

In the force-feeding of geese, the liver reaches a very large size, distends the peritoneum and occupies a place normally reserved for other organs, notably air sacs. This leads to

These different hypotheses, provided by several authors, demonstrate the importance of controlling sanitary conditions during feeding in the production of foie gras in palmipeds, of the kindness, of the control, of the breeders.

Such control cannot be possible in the case of intensive factory farming.

Morphological Aspect

In addition to severe steatosis, the liver appears moderately to extremely hyperplasic, with a uniform yellow coloration and coated. The lobular contours are rounded and the surface is smooth. On the cut surface the appearance is uniform, at least if there is no congestion or necrosis.

This is the macroscopic appearance observed in the fatty liver of force-fed animals.

From a histological point of view, even if the accumulation of fat may be physiological at the beginning and at first be present in the periportal region, the histological descriptions provided in the literature quickly reminds one of the hepatic lesions observed during fatty degeneration. This histological image goes hand in hand with the development of clinical signs, and signs of suffering observed in animals (see chapter on ethology) and with the development of changes in clinical biology (see chapter on clinical biology).

The histological evolution provided in particular by doctors C. Labie and C. Bernard is the following:

During force-feeding the hepatic cells store lipids. This storage is in a centrifugal fashion, beginning in the peri-lobular region in order to progressively fill all of the cells of the lobule.

At day 1, the duck's liver weighs +/- 100g and its hepatocytes are only filled with glycogen.

By day 3, the weight has doubled (200-220 gr) the cells are more bulky with a central nucleus. One starts to observe an accumulation of lipids in the form of micro-enclaves (lysosomes). The amount of total soluble sugars gets smaller. This concerns above all the peri-lobular cells (the two or three first peripheral rows of the lobule.

By day 6, the size of the cells has increased considerably. The lipid enclaves are numerous and very fine, giving the cells a spumous appearance. They appear to be completely surrounded by a fine cordon of protoplasm. The nuclei are still visible but often pushed back to the edge of the cell (weight 340gr). This progressively concerns all levels of the hepatic lobule.

By day 9 the rate of fatty material in this liver reaches 42% while the total soluble sugars have decreased and reach 2.5%. The cellular size has increased and it is difficult to

(general discomfort, anorexia, general weakness) and biological signs (increase in GPT, GOT, Alk Phosp, LDH…) are still reversible.

I mention here an example of the syndrome of feline steatosis well known to clinicians, which is an illness entirely reversible but leads nevertheless to clinical symptoms and easily discernable suffering which would be fatal if not treated in time: the example of equine hyperlipdaemia may be fatal and similarly characterised anatomically by a very severe hepatic lipidosis little associated with a necrosis.

If the aggressive factor is maintained (in the case of force-feeding, nutritional imbalance) a **cellular necrosis** develops, rupture of the cellular membrane, nuclear cariolyse…) This is irreversible. Necrosis is therefore the extreme and final limit of cellular suffering.

Necrosis lesions may develop at variable stages of fatty degeneration.

In the case of intoxication, cellular destruction occurs before the accumulation of fat is severe, before cellular distension.

In the case of nutritional or metabolic imbalance, the aggression is less severe and the pathology more progressive. The accumulation of fat takes a longer time. One therefore has the time to see the cell distend, hepatic insufficiency take place progressively and it is only at the extreme state of distension that the cellular membrane ruptures and necrosis takes place.

Toxic hepatic necrosis would be equivalent to a massive dietetic necrosis and the result of nutritional deficiency.

Taking into account bibliographical data on the origin of necrosis lesions of the liver, three hypotheses may be given in the case of foie gras:

- infection – due to the frequent presence of the source of inflammatory cells;

- toxicity – the understanding of the term toxic includes the absorption of toxins (type microtoxin) brought about by bad quality corn which leads to nutritional imbalance (lack of amino acids, vitamins and oligo-elements in subjects badly prepared for force-feeding).

- circulatory origin – with the phenomenon of tissue anoxia due to a too excessive hypertrophy of the liver at the end of force-feeding, but also defective hygiene and ventilation at the enclosure of the force-feeder, by the cramming in of animals in cages and vehicle transporters. Due to the extreme fragility of these animals, this would be enough to provoke the development of necrosis in the fatty liver, which had been of good quality, within a few hours.

capacity to control the movement of ions across its membrane. It is often associated with a tinctorial variation of the cytoplasm.

Steatosis describes an anormal accumulation of triglycerides in the cellular parenchyma. It is observed above all in cells which metabolise a lot of fat. It is observed in the liver, the kidney, the heart and muscular tissue.

At one time steatosis was called fatty degeneration or fat infiltration. Nowadays we prefer the denomination of 'steatosis' because fat is not an infiltrate and because the presence of intracellular lipid does not necessarily indicate a degenerative process.

Such examples are found in geese: under natural conditions, before migration, one can observe with certain migratory birds, a slight accumulation of fat in the peri-lobular hepatocytes. This accumulation is in the form of micro-vacuoles and do not distend the cell. It is physiological and is not associated with symptoms of cellular or animal suffering. In the case of foie gras, on the other hand, as will be described further on, one observes the establishment of fatty degeneration.

Fatty liver is a term used to describe a liver which contains more visible lipid (in general in the hepatocytes) than normal. It represents a non-specific response which may be present in several diseases. Morphologically, it shows itself by the presence of vacuoles filled with lipid within the cytoplasm.

The liver fulfils numerous metabolic functions which are indispensable for survival. One of these functions is to transform the fatty acids absorbed by the intestine, or from body fat reserves, into triglycerides, which will be metabolised again into slightly dense lipoproteins. The latter may also be transported in the blood.

Fatty Acids

BLOOD

Any kind of disturbance in the synthesis of proteins, phospholipids or of ATP has the potential to inhibit the synthesis of lipoproteins as well as the synthesis of triglycerides and the absorption of fatty acids continue leading to an access in the accumulation of triglycerides in the hepatocytes. An excessive uptake of triglycerides or an excessive mobilization of reserves may also surpass the capacity of the liver to metabolise them whilst it continues to store them.

- If the accumulation is slight, the steatosis is not pathological, it does not correspond to a fatty degeneration.

- If the accumulation of fat reaches the stage where it fills the cell, it pushes the nucleus towards the periphery. The nucleus becomes pycnotic. Then one is faced with fatty degeneration. At this stage the lesions whilst showing clinical signs

REPORT ON NUTRITIONAL HEPATIC STEATOSIS AS HEPATIC PATHOLOGY

Heimann Marianne, Annick Delire

Hepatic steatosis caused by force-feeding in palmipeds is an acquired pathological process whose first symptoms appear as a fatty deterioration of the hepatocytes then by necrosis.

If at the beginning of force-feeding, the process is organised somewhat like, and belongs perhaps even still to, a "physiological process" with centrifugal accumulation in the cells within each lobule, it very quickly goes beyond this state of hepatic adaptability, as in the case of all dietary or metabolic imbalance.

In order to better base my commentaries , I will take up the classical definitions in argumentation, description etc. provided in the literature of (ref: **Veterinary Pathology, Jones and Hunt**, fifth edition, Lea & Febiger, **Pathology of Domestic Animals, Jubb, Kennedy and Palmer**, third edition, Academic Press, **Mechanisms of Disease, Slauson, Cooper,** second edition, Williams & Wilkins, **Pathology, basis of disease, Cotran, Kumar, Robbins,** fifth edition, Saunders).

Cellular Lesion is defined as any change which results in loss of cellular capacity to maintain its homeostatic state. The lesioned cell is therefore incapable of maintaining in balance all the normal processes which regulate its internal environment.

This brings about changes which are detectable by clinical biology, pathological anatomy (ultrastructural, microscopic and macroscopic) and finally by clinical symptoms.

The pathogeny of the cellular lesion may be summarised by two main mechanisms: an interference with the energetic supply of the cell or a direct lesion on the cell membrane.

The contributing factors are very variable, I will cite here just the main ones: l'hypoxia (ischaemia, infarcissements) physical factors (traumas, radiation…) chemical factors (toxins, excess of certain elements…) genetic anomalies, biological factors (bacterias, virus…) **malnutrition** (deficiencies, excess).

There are two stages in cellular lesions, the **reversible lesions** and the **irreversible lesions.**

The reversibility of a lesion absolutely does not mean that there is no pathology and no suffering.

Reversible lesions: The reversible lesions most frequently observed in histology are **cellular distension and steatosis** (fatty change). **Cellular distension** is an early universal sign of a pathological process. This cellular swelling comes from the loss of the

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of Thelma Lee-Gross, USA, with the Belgium Dermatology group, Dr I. Remy, J. Fontaine, L. Beco...
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- Mammal, bird, fish and human pathology : **throughout my residency and during a benevolat at the New England Aquarium, IPG.**
- Electromicroscopy : **Mallory Institute; VA medical Centre, Jamaica Plain and IPG.**
- Immunochimistry : **Angell Memorial Animal Hospital (AMAH); Mallory Institute and**
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- Cytology: **organisation of the AMAH cytology slides collection; Mallory Institute; VA**
Medical centre, Jamaica Plain and IPG.
16
- Molecular biology : **PhD Program, Boston University School of Medecine (BUSM); Mallory Institute and IPG.**
- Toxicology and laboratory animals: **Mallory Institute of Pathology; BUSM;**
Tuft University Animal diagnostic laboratory; IPG.
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Vétérinaria, 1994, (I), 36-38

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Conclusion and Personal Interpretation

What is striking about the comparison between the two diets, is the fact that in the feeding of the factory-farmed duck, one only talks about quantity, kcal and level of production.

The feeding during this force-feeding period is directed solely to produce hepatic steatosis; an excess of unbalanced foodstuff is given which is highly energetic; in this instance, corn, fat and salt.

The fat and salt are not directly taken into account because the salt serves just to aid digestion, and the fat only facilitates the work of the force-feeder in helping the foodstuff slide.

Nowhere do we find mention of the possible supplements which should be given at the same time as this *food* to cover the physiological needs of the animal.

It should be remembered that these animals are always (from a physiological point of view) in a growth period. No care is taken, from the nutritional point of view, of the protein needs for the synthesis of this animal.

I have not found any comparison between types of corn, no chemical analysis of the proteins, vitamins, or minerals.

It is obvious that the lack or excess of such or such parameter is not taken into account, because the animal will be slaughtered before showing one or other symptom as a consequence of this excess or lack.

One finds all the data relative to the diameter of the nozzle to use, the way in which to insert the probe or the price per kilo of the feed.

In the first type of diet, one takes care to counter excess, lack and pathologies relative to feeding problems.

The final point to make, is that the animal is not taken into account in the last type of feeding, the only thing that matters is profit, cost and production.

All breeders agree to acknowledge that the Barbary duck is not adapted for force-feeding because of the non-differenciation of its crop, but that doesn't matter, one just has to adapt the animal so that it can be force-fed.

The only thing that I gleaned from all the articles which I read, is that one has to find the right moment to stop feeding the animal, to avoid the prospect of its dying before it has been slaughtered. To conclude: one cannot objectively compare the feeding of ornamental ducks and force-fed ducks, because in the case of force-feeding one cannot talk of feeding. Dr Guilmot Jean-Michel

Prot is the quantity of protein retained (g)

Lip is the quantity of lipids retained (g)

Attention, this formula is usable as ***Maintenance needed under conditions of thermal neutrality (or 25°C for adults).***

Needs in amino acids

These are formed by energetic needs, which are, in general, low in most of the amino acids and for growth needs. The latter depend on the intensity of synthesis.

In works dealing with breeding, the following advice is given:

"It is wise to use food which has the lowest price, according to the price of raw materials, (expressed in per 1000K calories and no longer by kilogram) and which has a fat content compatible with the desired fattening rate of the carcass[14]".

Recommended Additional Vitamins
Vitamin A 2600 (IU)
Vitamin D3 330 (CIU)
Vitamin E 6.67 (IU)
Riboflavin 1.33mg

Food given during force-feeding

In animals aged 12 weeks, forced feeding in two daily meals of steamed or non-steamed corn over 12-21 days, allows for an average production of foie gras of 450g (maximum 800g).

The foodstuff is comprised of corn, salt (15gr/kg dry corn) and fat (25kg dry corn); salt plays a role in facilitating digestion and the fat a role as lubricant[15].

One can add bicarbonate of soda and starter culture to increase digestibility.

It would appear that the force-feeder plays a role in determining the quantity of corn given for a fixed weight gain.

[14] B Sauveur H de Carville, le canard de Barbarie INRA 1990 pp 46

[15] La production de foie gras: Office de promotion des petits elevages en wallonie-centre de zootechnie-rue des champs elysees, 4, B5300 Ciney

Phosphorus

The recommended dose of phosphorus for ducklings is 0.6%. If the dose is increased to 1% no negative or positive effect is shown on weight gain.

Sodium

A poor dose of sodium is quickly fatal. The recommended doses of sodium chloride are 0.3%. If a dose of 1% is exceeded a low significance of weight gain is noted.

Recommended feeding for Barbary Ducks
(Feeding intended for meat production[11])

The nutrition for an animal species implies knowledge of 1) the digestive use of the foodstuff and its constituents (proteins, lipids, carbohydrates and minerals); 2) regulation of ingestion of the foodstuff and the influencing factors; 3) the needs of the animals taking into account the weight of the live animals and their synthesis. In the case of growing animals, this last aspect mainly covers tissue synthesis[12].

Adaptation of food ingestion

Like many species, the duck reduces its food consumption if the temperature increases and increases it if the temperature falls.

Ducks can cope with relatively low temperatures by increasing the quantities ingested.

Force-feeding consists of the daily ingestion by ducks of a large quantity of foodstuffs high in energy, which leads to intensive fattening and the formation of foie gras (fatty liver[13]).

Energetic needs

In order to meet energetic needs there is a valid formula viable for all species:

E=105P0.75+10.4 Lip

Where E is the daily energy need (K calories)

P is the live weight e (kg)

[11] B Sauveur, H de Carville, ed. Le canard de barbarie INRA 1990 pp44-52
[12] Bernard Leclerq
[13] La production de foie gras, Office de promotion des petits elevages en wallonie – centre de zootechnie – rue des champs elysees, 4 B 5300 Ciney

The muscular dystrophy caused by hypovitaminosis E in ducklings is not prevented by a supplement of cystine (as is the case with galliforms)[8].

The prevention of muscular dystrophy due to a problem with vitamin E is associated more with nutritional deficiencies in selenium. (A weak supply of selenium greatly reduces the need of vitamin E[9]).

Vitamin B1 (Thiamin)

Duckings start to lose weight 4 days after having been put on a diet poor in vitamin B1.

Vitamin B2 (Riboflavin)

A deficiency in riboflavin in ducklings results in poor growth and higher incidence in mortality. In adults, a deficiency causes a higher incidence of embryonic mortality.

For anseriforms the deformation (inversion) of the toes is not shown to be due to a riboflavin deficiency.

Nicotin Acid (Nyacin)

Nyacin requirements are much higher during growth. Nyacin is responsible for the good growth of feet, and a deficiency causes deformation in the arch of these feet. Nyacin is barely present in traditional foodstuffs, a supplement would therefore be necessary.

Biotin

Biotin is associated with different types of dermatitis due to deficiencies in certain species. Anseriforms do not appear to suffer from this.

Chlorin

A deficiency in chlorin is associated with perosis and fatty degeneration of the liver.

Requirements and minerals

Calcium

The recommended dose[10] for ducklings is 0.6-0.8%. A dose of 1-1.5% leads from a progressive to serious loss of weight.

Ducklings receiving a dose containing 0.17% show signs of osteoporosis.

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[8] Scott MI, Dean WF: Nutrition and management of ducks, Ithaca, MI Scott of Ithaca, 1991

[9] Jager FC effect of dietary linoleic acid and selenium on the requirement of vitamin E in ducklings. Nutri and metab 14: 210-227, 1972

[10] Scott MI, Dean WF: nutrition and management of ducks. Ithaca, MI Scott of Ithaca, 1991

It is more difficult to determine the sex of an animal during winter, for there are fat deposits around the genitals and digestive tubes. On the other hand I have never seen a yellow liver through an endoscope (that is on a living animal in satisfactory health) that is estimated satisfactory to be anaesthetised and sexed[7].

Protein Requirements

There are a number of differences noted in anseriforms which can be explained by their ability to adapt their growth rate to the nutrients available.

A balanced diet could be a mixture containing various cereals such as corn, barley and oats. Fish flour, soya flour and bone powder can also be added. The more diversified the food, the less the risk that there will be a lack in such or such amino acid over the long term. In fact if the diet is always the same and an imbalance in amino acids shows up after a long time, there will be an excess in some and a lack of other amino acids.

With a mixture of this type it is necessary to find all the amino acids necessary or risk insufficiency in methionine, cysteine, and lysine.

Vitamin Requirements

Vitamin A:

Requirements of 5-100000 IU. This vitamin is important for increasing the value of the feed.

hypovitaminosis A is associated with weak musculatory development, weakness, and a delay in bone growth, ataxia, paralysis and death. Chronic hypovitaminosis in anseriforms is suspected (but not proven) as the cause of "Bumblefoot" (cracked lesions on the sole of the foot with hyperkeratic production).

Vitamin D3:

This vitamin plays an essential role in the synthesis and mineralization of the bones. A deficiency in vitamin D3 can occur in animals which show a deficiency in the enzyme responsible for the conversion of the vitamin found in food into an active vitamin (1.25 dihydroxycholecalciferol).

Vitamin E

Hypovitaminosis E is not associated with anseriforms with encephalomalacy as in other species.

[7] Sexing of birds such as cranes, storks…is made by endoscope i.e. insertion of rigid endoscope into the left rear air sac. The examination is undertaken under general anaesthetic

The fat contained in foodstuffs for dogs is very much higher than what is acceptable for ducks, especially when grain is also added.

The majority of ducks have a tendency to lay down excess fat in the abdomen, around the heart and stomach. Obese birds frequently die of fatty deterioration of the liver.

Adequate levels of choline have been recommended to protect anseriforms from the accumulation of fat in the liver[4].

Many experimental breeders are convinced that aquatic birds need a ration rich in protein. This belief is inexact and dangerous. Many ducks and geese are mainly herbivores, and the majority of grasses do not have more than 17% protein. A diet rich in protein for animals leads to fatal kidney problems. In conjunction with this problem, the birds require a very high level of liquid intake and even a slight deprivation of water leads to irreversible consequences for the kidneys.

Wild aquatic birds adapt their food intake according to their needs of the moment. Females at the point of laying, for example, increase the amount of food ingested if this foodstuff is poor in calcium. In the same way, animals increase the amount of food rich in energy when preparing for migration.

The same foodstuff given to animals in captivity predisposes them to problems of obesity and problems in the metabolism of fats[5].

Nutritional Needs

Energy Requirements

The dietary needs for energy for ducks and geese is approximately the same as that for chickens. These needs change according to outside temperature. If the temperature goes down, the energy needs increase according to the needs to assure thermogenesis of the animals. It is an error to think that birds 'gorge' themselves so that they have enough reserves for migration[6]. It is true that as autumn approaches, when days start to get shorter, and the temperature gets colder, that birds increase the amount of food they ingest and store fat subcutaneously, and around certain organs, such as the heart, the liver, the kidneys and digestive system.

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[4] Richie, Harrison and Harrison AVIAN MEDICINE; PRINCIPLES AND APPLICATION 1994 wingers publishing pp 1246-1247

[5] Richie, Harrison and Harrison AVIAN MEDICINE; PRINCIPLES AND APPLICATION 1994 wingers publishing pp 1248

[6] Personal experience at Parc Paradisio on examining +/- 2000 birds of all types inc. cranes, storks, geese ducks…

Comparison of different diets

Note: It is important to note that the diets discussed here are the diets calculated to maintain the animals in good health and not for those only destined for meat production.

Recommended Diet for Ornamental Anseriforms

(Diet calculated by American nutritionalists[3])

Starter for wild ducks (used during the first three weeks of life).

Ingredients/Ingredients pounds/tonne
Corn 933
Oats 200
Wheat 300
Soya flour 50% protein, poor in fibre 250
Fish flour 160
Small milk, 55%l lactose 20
Spent grain from the brewing industry 20
Dehydrated alfafa 100000UI Vit A 60
Calcium phosphate 10
Calcium carbonate 30
Salt, Iodine 5
Mangenese sulphate 0.5
Copper sulphate 0.5
Zinc carbonate 0.25
DL-methionine 1
Vitamins
Vitamin A 10000000 (USP)
Vitamin D3 1500000 (CUI)
Vitamin E 5000 (IU)
Riboflavin 3 gm

Hyde D.O. (Ed) Raising wild ducks in captivity. New York E.P. Dutton & Co 1974

In the treatise on avian medicine by Ritchie Harrison and Harrison one notes:

- rations designated for commercial feed for ducks are not recommended for use in the long term. These rations are calculated to produce a good carcass and usually contain growth additives and stimulants to promote feather growth.

[3] Hyde D.O. (ed): Raising wild ducks in captivity. International wild waterfowl association. New York: E.P. Dutton, 1974 pp 155-167

This implies that certain animals manage to fill up their crop twice a day and meet their needs for the next 24 hours. This is most marked in animals which have a grain-based diet. On the other hand, animals which feed on vegetables have to spend more time to achieve the same amount of calories[2].

Animals who feed on grains and plants are animals which can be fed easily on commercial food manufactured for poultry, anatides, indeed even those for dogs.

The animals which feed on grass or greenery may also adapt to commercial foodstuffs but only in small quantities. In addition these animals must have permanent access to an outside area containing numerous species of grasses.

The average quantity of food given per duck at the *Wildfowl Trust* at Slimbridge in England is 130gm/bird/grain per day (barley, wheat) and 10gm/bird/baby biscuit.

An average sized goose, only eating grass, eats approximately 750gm/day in winter. In captivity, this number must be revised downwards, for the bird has reduced needs due to inactivity and uses more grains.

During periods where they shed their feathers or in unfavourable climate conditions, the quantities of foods are increased, as they are during reproductive periods.

In this work, we compare the feeding of anseriforms in parks and zoos with those of anseriforms used for meat production or foie gras.

This allows us to see which criteria are considered important for those who derive an income from animal production other than from the sale of domestic animals.

It should be noted that in the case of animals destined for parks or bird fanciers, the longevity of the animals is much greater than for those animals destined for the butchers. There must therefore be certain factors which would have to be taken into account over a long term, which will play less of a role in meat production.

[2] Karlson, A.G. Davis C.L. and Cohen M.I Skotochromogenic *Myobacterium avium* from a trumpeter swan Am J Vet Res 23:575, 1962

Comparative report on the feeding of anatides
by

Dr J M Guilmot

Abstract

In this paper the author is interested in the comparison between different types of feed used for ornamental anseriforms in parks and zoos. Herewith is an analysis of the advised rations with the pathologies pertaining to lack and excess of different food constituents;

Included are the rules given in works dealing with feeding during periods of force-feeding.

We contend that for force-feeding, only high energy food is rated. And little or no interest is given to the qualitative aspect of the nutriments used.

In conclusion, one cannot talk of food when speaking of force-feeding, since the foodstuff used does not cover the physiological needs of the animal.

General Remarks

From the physiological point of view, the growth rate of anseriforms is generally quicker than for galliformes.

Species which live in more extreme latitudes have greater growth, than those which live in our latitudes.

The growth rate appears to be related to the length of the day[1].

There is a lot of information about the feeding of factory-farmed anseriforms but very little about non-domestic species.

In the wild animals have a choice between grains, plants, invertebrates and fish.

The food which wild animals eat varies from species to species according to the periods in the day when the animal feeds itself, as much as by the number of minutes in a day spent feeding.

[1] Kear J Feeding and Nutrition. In Fowler ME (ED) Zoo and wild animal medicine Saunders Co 1986 pp.335-341

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Travaille pour le Amo Safari Parc (principalement autruches, emeus, flamands roses, aras....).
Travaille pour le zoo de Lochristi et Harry Maalter
En 1989 je commence à me spécialiser en sexage des oiseaux par endoscopie.
En 1992, je commence à travailler pour le Parc Paradisio (Parc à vocation oiseaux principalement)
En 1994, je deviens inspecteur de quarantaine pour le Parc Paradisio.
Depuis 1994 , je sexe par endoscopie pour plusieurs importateurs en perroquets et oiseaux exotiques tels que grues, flamands roses .....

conditions in which this food is produced. An alternative could be found, this time only using the physiological capacity of the animal. In fact, they could willingly eat as much as they wanted and produce a fattier liver than normal. This is, after all, the origin of this traditional product.

3. Report by Dr Beck

RESUME

It has been noted that, as well as the pathologies normally attributed to palmipeds (not pursued in this account), force-feeding is the cause of a number of maladies.

These ailments are a reflection of the "quality" of the system of production: the "good practice" associated with hygiene, disease prevention, training in use of the force-feeder, etc… to reduce to a certain extent, the resultant knock-on effects on the state of health and well-being of the animals. In certain cases, according to the severity of the deficiencies and the quality of care given, the general state of health alters, indeed, death occurs. Furthermore it also poses the sensitive problem of the residues of their treatment being present in the meat, given the immediacy of slaughter.

4. Report by Dr Van Berchem

RESUME

In an era of neuro-psycho-physiology, it seems absurd to only take blood physiology as the sole criterium in evaluating well-being. It is unanimously recognised today, in other species, that certain abnormal behaviour such as stereotypes, hyperagression, pathologies, are proof of mental suffering, and could be the consequence of difficulties in handling certain exterior constraints, and are a reflection of a progressive disturbance of neurotransmitters. It should be agreed, therefore, that a correlation be made between blood and ethological evaluations, before coming to conclusions about well-being solely from blood analysis.

Report by Professor René Zayan

RESUME

Ethological expertise certainly does not affirm, as one often hears, that before the period of force-feeding the ducks are maintained in farming conditions which assure them a maximum of well-being. On the other hand, there is absolutely no doubt, that force-feeding subjects them to physiological and behavioural suffering which dramatically reduces their well-being. This is why the assertion that these animals would not produce foie gras (and in such quantity) if they were maltreated seems to us, untenable. On the contrary, force-feeding constitutes a reprehensible practice from an ethical point of view.

Resume of the veterinary reports

1. Report by Dr Guilmot

RESUME

The author is interested in the comparison between the kinds of feeding used in parks and zoos for ornamental anseriforms. There follows an analysis of the recommended ration, with the pathologies pertaining to lack and excess in different food combinations:

Following on from this are the rules given in works dealing with feeding given during the force-feeding period.

We contend that for force-feeding, only food which is high in energy is rated. And little or no interest is given to the qualitative aspect of the nutriments used.

In conclusion, one cannot talk of food when speaking of force-feeding, since the foodstuff used does not cover the physiological needs of the animal.

2. Report by Dr Heymann

RESUME

The excessive lipid load observed in the livers of ducks and geese at the end of force-feeding is, from the anatomopathological point of view, a lesion, and not part of the normal physiological process. The lesional character of these alterations is also confirmed by the changes in clinical biology (increase of hepatic enzymes in the blood etc). In no instance, can this increase be considered normal. It is a categoric sign of a diseased state and a clinical symptom (difficulty in breathing, difficulties in regulating temperature, exhaustion, difficulties in making an effort etc.) Therefore one is not making use of a natural physiological process in palmipeds to produce a delicacy but rather a pathological process which can be reproduced in certain species. If the liver of a goose or a duck is used, it is because the pathology is easier to reproduce.

In addition to the lesions caused directly by force-feeding, the immune system, as well as the liver, is rendered frail to cope with any stress to which the animal is subjected.

The animal therefore often develops infections, which can be combatted by the use of antibiotics. This however, poses the very serious problem of having residues of antibiotics within food destined for human consumption.

I acknowledge that foie gras whilst being a completely unnecessary food for man, is a highly appreciated delicacy. Nevertheless, the means of obtaining this delicacy, and the money which it fetches, above all for a minority, does not justify the extremely painful

for larger species). It would seem logical to propose this as an "acceptable" figure for the level of steatosis induced by artificial means into birds.

Seasonal self-inflicted force-feeding appears to be the only acceptable ethical practice concerning production. In effect it limits – by means of a complex game of feedback – steatosis to levels which are not considered pathological, such as found in birds in the wild.

Dr Y Beck

1. These four reports show the **contradictions** which exist within each of the areas under study, with regard to Article 16: paragraph 1:

   (1) **Report on Feeding** (normal) of anatides compared to the force-feeding rations presented by Dr JM Guilmot.

   (2) **Anatomical-pathological report** on nutritional hepatic steatosis as well as hepatic pathology, presented by Dr M. Heymann

   (3) **Report on diseases** caused directly or indirectly by the practice of forced feeding, presented by Dr Y. Beck

   (4) **Ethological report** on the evaluation of stress and decrease in well-being amongst force-fed birds, presented by Dr V. Van Berchem.

2. **Ethical Objections** to this kind of practice rests on the following three general findings:
   1- Intensive farming methods (individual cages – pneumatic force-feeding…) due to industrialisation of farming must be banned. They are the cause of a dramatic reduction in the well-being of birds.
   2- The end result of force-feeding is – hepatic steatosis – which is a liver disease. This causes – at different degrees during its development – physiological and physical problems which are detrimental to the state of health and well-being of birds. Eventually the hepatic steatosis will lead to the death of the birds.
   3- Force-feeding is finally, a practice against nature, which violates the natural prehension of food. Therefore the contention that the introduction of such equipment reduces the well-being of the birds subjected to it.

3. In conclusion **the commentaries** of article 16 paragraph 2 **must be modified** in the following manner:

- The practice of force-feeding ducks *results in badly affecting their well-being* during the procedure.

- Force-feeding *leads* to pathological steatosis which compromises the health and well-being of ducks.

It should be noted that natural steatosis linked to the stocking of reserves before migration, never exceeds the initial volume of the liver by a **factor multiplied by 2** (**1.5**

Introduction

Force-feeding to fatten palmipeds is an ethically unacceptable practice, and is in total contradiction to the recommendations concerning Barbary and Mallard ducks, issued by the Permanent Council of the European convention on the protection of farmed animals. (T-AP)

Article 16 paragraph 1 indeed stipulates:

"All ducks must have access, in an appropriate fashion, to *adequate, nutritious, balanced and hygienic food (1)* every day, and a sufficient quantity of water, of satisfactory quality, at every moment/…

The *methods* of feeding, and the additives in the foodstuffs, which are *the source of lesions, anguish or illness (2-3-4)* for the ducks, or which may result in the development of *physiological or physical conditions affecting their health (2-3) and well-being (4)* must not be authorised".

Article 16 paragraph 2 continues:

"The practice of force-feeding ducks *may result* in badly affecting well-being during the procedure.

Force-feeding *may lead* to pathological hepatic steatosis which compromises the health and well-being of the ducks.

/… In countries where force-feeding is authorised, research must be carried out to develop *methods of feeding which do not imply forced administration* of food and *which would not result in pathological steatosis* of the liver.

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Report By Belgian Experts

This consists of four sections, produced by four independent Belgian vets, who each had a particular competence within the area on which they commented. Their CV and a brief resume of their conclusions accompanies their work. We would like to thank other scientists – from different disciplines – who have helped by giving us their valuable advice.

Council of Europe **T-AP (95-20)**

Permanent Council of the European Convention on the protection of farmed animals (T-AP)

32nd Meeting Strasbourg 8-11 October 1996

Report on force-feeding

by Belgian experts (1996)