Animal Legal Defense Fund

PETITION BEFORE THE
UNITED STATES DEPARTMENT OF AGRICULTURE (USDA),
FOOD SAFETY AND INSPECTION SERVICE (FSIS)

ANIMAL LEGAL DEFENSE FUND, INC.,
170 East Cotati Avenue
Cotati, CA 94931

Petitioner,

Filed with:

TOM VILSACK,
In his official capacity as Secretary,
United States Department of Agriculture
1400 Independence Avenue, Southwest
Washington, D.C. 20250

and

ALFRED V. ALMANZA,
In his official capacity as Administrator,
Food Safety and Inspection Service
United States Department of Agriculture
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CITIZEN PETITION

The undersigned submit this petition to request that the United States Department of Agriculture ("USDA") take regulatory action to withhold its official mark from foie gras products not bearing a notice informing consumers that foie gras is derived from diseased birds.

On November 28, 2007, the undersigned and others filed a rulemaking petition with the USDA seeking to exclude force-fed foie gras from the human food supply as an adulterated food product on grounds that foie gras is a product of a diseased animal and thus not fit for human consumption. On August 27, 2009, FSIS denied the petition. That denial is arbitrary, capricious, and in violation of the APA, and will be subject to judicial review. The instant petition is intended to at least ensure that consumers are not misled by the USDA's labeling practices, until the production of the product can be properly regulated.

The USDA is responsible for ensuring that poultry products are wholesome and properly labeled. Poultry products passed and inspected by the USDA must bear an inspection legend stating: "Inspected for wholesomeness by the U.S. Department of Agriculture." Under the Poultry Products Inspection Act ("PPIA"), the USDA is also responsible for ensuring that labeling and marking on poultry products do not mislead consumers. The USDA Secretary may prohibit use of misleading marking or labeling until it is modified in a way he prescribes.

Foie gras products, which are derived from the livers of birds deliberately force-fed to acquire a metabolic disease, now bear the USDA's seal of approval. Force-feeding induces liver disease by fattening and distending the birds' livers—the fatty, enlarged livers constitute foie gras. These sickened birds often have difficulty standing, walking, and breathing, and may die before slaughter, or even during the force-feeding process. Force-fed birds regularly have bacteria or toxins in their blood, and they carry protein fibers that may induce a fatal disease in humans that is similar to Creutzfeld-Jakob Disease (the human variant of Mad Cow Disease).

There is nothing wholesome about these animals. Intentionally inducing a cruel and debilitating disease in animals that also poses a risk to humans, simply to make the animals taste better, flouts the basic principles of the U.S. food safety regime.

Consumers rely on the Agency's assurances of wholesomeness when selecting poultry products – presumably that is why the USDA inspection seal exists and is used. Because consumers expect the USDA to approve only products from disease-free animals, stamping foie gras products with the USDA seal without disclosing that those products are derived from diseased birds misleads consumers, contravening the PPIA.

I. Action Requested

Pursuant to the Right to Petition Government Clause contained in the First Amendment of the U.S. Constitution,[1] the Administrative Procedure Act,[2] and the USDA's implementing

[1] U.S. Const. amend. I.
[2] 5 U.S.C. § 553(e) (2006).

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regulation,[3] the undersigned submits this citizen petition for rulemaking under the PPIA,[4] requesting that the USDA take regulatory action to withhold use of its official mark on foie gras products unless those products are labeled as derived from diseased birds.

The proposed label should state, in type determined by the USDA to be of uniform size and prominence:

NOTICE: Foie gras products are derived from diseased birds.

II. Interests of Petitioner

Petitioner Animal Legal Defense Fund ("ALDF") is a national nonprofit organization involved in every aspect of legal advocacy on behalf of animals. ALDF has spent over three decades focusing on issues involving animals and the law, with a focus on assisting agencies, courts, and legislatures in carrying out the public policy against animal cruelty and advancing the protection of the interests of animals through the legal system.

ALDF's groundbreaking efforts to use the legal system to end the suffering of abused animals are supported by hundreds of dedicated attorneys and more than 110,000 members. ALDF has been involved in the protection of animals used and sold in commercial enterprises, frequently with a focus on cruelty and the intensive confinement of animals used for food.

Some ALDF members eat meat and other animal products, including poultry products from ducks and geese. These ALDF members seek to receive accurate information about the poultry products they purchase and to reduce the cruel treatment of the animals they ultimately consume and ensure the wholesomeness and safety of their food.

ALDF members rely on USDA assurances when selecting poultry products. They are harmed when farmed animals are treated cruelly or illegally, or when labeling or marking on poultry products is misleading. Reasonable consumers need to know when a product carrying a USDA inspection seal comes from an animal in whom a cruel and debilitating disease has been

[3] 7 C.F.R. § 1.28 (2011).

[4] 21 U.S.C. §§ 451–472 (2006). 21 U.S.C. 457(d) states that "[i]f the Secretary has reason to believe that any marking or labeling . . . in use or proposed for use . . . is false or misleading in any particular, he may direct that such use be withheld unless the marking, labeling, or container is modified in such manner as he may prescribe so that it will not be false or misleading." The FSIS Administrator is authorized to do the same. 9 C.F.R. § 381.130 (2011).

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intentionally induced, a disease that also poses a risk to humans. Failure to notify makes the labeling misleading by omission.

III. Statement of Grounds

Food labels in general, and government assurances of wholesomeness in particular, significantly influence consumers' decisions about food purchases. The U.S. government thus has a strong interest in ensuring that labeling and government seals of approval permit consumers to make knowledgeable choices. The USDA has publicized the importance of the accurate use of seals, and consumers' reliance on those seals, stating that "[t]he mark of inspection gives consumers confidence that the meat, poultry and processed egg products they are about to enjoy are safe and wholesome."[5]

Although the USDA is responsible for ensuring that poultry products are wholesome and labeled in a manner not misleading to consumers, and foie gras products bear the Agency's seal of inspection, no labeling discloses that those products are diseased. Consumers expect the USDA to keep diseased products from the market, so marking foie gras products as inspected and passed by the USDA leads consumers to believe that those products are not diseased. Failing to label foie gras products as diseased frustrates Congress' will that labeling on food accurately reflect essential characteristics of a food product and misleads consumers. Labeling foie gras products as derived from diseased birds corrects this problem.

A. The USDA is responsible for ensuring that poultry products are wholesome and properly marked and labeled.

Under the PPIA, the USDA is responsible for assuring that poultry products are wholesome and properly marked and labeled.[6] The Secretary of the USDA, or a delegate, is responsible for promulgating rules and regulations under the PPIA.[7] Responsibility for

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[5] See USDA's "Faces of Food Safety," USDA Blog (*available at* http://blogs.usda.gov/2011/08/19/faces-of-food-safety/, last checked September, 7, 2011).
[6] 21 U.S.C. §§ 451-472.
[7] *Id.* at § 463(b).

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promulgating rules and regulations has been delegated to the Administrator of the Food Safety and Inspection Service ("FSIS").[8]

1. The USDA oversees the detection and destruction of diseased poultry products, ensuring that those products are not sold for human consumption.

The PPIA requires that "the health and welfare of consumers be protected by assuring that poultry products distributed to them are wholesome, not adulterated, and properly marked, labeled, and packaged."[9] To this end, the FSIS has an existing policy of preventing sick animals from entering the food supply.

The PPIA prohibits commercial trade in "any dead, dying, disabled, or diseased poultry or parts of the carcasses of any poultry that died otherwise than by slaughter" unless the Secretary "assure[s] that such poultry, or the unwholesome parts or products thereof, will be prevented from being used for human food."[10] The PPIA also prohibits products consisting "in whole or in part of any filthy, putrid, or decomposed substance" or products "for any other reason unsound, unhealthful, unwholesome, or otherwise unfit for human food."[11]

2. When the USDA does allow parts of diseased birds to enter the market, the diseased organ or tissue is first removed and condemned.

The PPIA requires the condemnation of parts of a bird an FSIS inspector finds to be adulterated.[12] For example, a part of a carcass that is affected by a tumor, infested with parasites, or badly bruised must be condemned.[13] After the unwholesome part is removed and condemned, the FSIS inspector passes other parts of the same bird if those parts are reprocessed and the inspector does not find them to be adulterated.[14] Hence no authority permits the passing of foie gras. Until a court reviews the USDA's arbitrary and capricious refusal to properly regulate the

[8] 7 C.F.R. § 2.53(a)(2)(i).
[9] 21 U.S.C. § 451.
[10] *Id.* at § 460(d).
[11] *Id.* at § 453(g)(3).
[12] 9 C.F.R. § 381.72.
[13] *Id.* at § 381.87–381.89.
[14] *Id.* at § 381.72.

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production of the product, the Agency should at least take steps to ensure that the use of its seal and labeling practices are not misleading consumers.

B. The USDA is obligated to withhold its official mark where doing so is necessary to ensure that marking and labeling on poultry products does not mislead consumers.

The PPIA prohibits marking or labeling that is false or misleading.[15] If the Secretary of the USDA has reason to believe that marking or labeling is misleading, he may "may direct that such use be withheld unless the marking, labeling, or container is modified in such manner as he may prescribe so that it will not be false or misleading."[16] The Administrator of the FSIS may do the same.[17]

C. Foie gras products now bear the USDA's official mark.

USDA regulations require federally inspected and passed poultry products, including foie gras products, to bear a prominent inspection legend on the principal display panel[18] that states: "Inspected for wholesomeness by U.S. Department of Agriculture."[19] The USDA permits foie gras products to be labeled with grades "A," "B," or "C" according to standards the Agency has established.[20]

D. Foie gras producers intentionally induce disease in ducks and geese, deriving foie gras products from those diseased birds.

Foie gras, meaning "fat liver" in French, is the enlarged and fatty liver of a duck or goose. To produce a fatty liver, workers thrust pipes down the necks of ducks or geese and pump

[15] 21 U.S.C. § 453(h)(1).
[16] *Id.* at § 457(c).
[17] 9 C.F.R. § 381.130.
[18] *Id.* at § 381.123.
[19] *Id.* at § 381.96.
[20] USDA, FSIS, FOOD STANDARDS AND LABELING POLICY BOOK (Aug. 2005) (*available at* http://www.fsis.usda.gov/OPPDE/larc/Policies/Labeling_Policy_Book_082005.pdf, last checked September 7, 2011)

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large quantities of nutritionally deficient food down the birds' throats two or three times a day for two to four weeks, which causes great expansion of their livers.[21]

Force-feeding birds for the production of foie gras is intended to induce a disease in the birds known as hepatic lipidosis or steatosis. A statement recently adopted by more than sixty licensed veterinarians concluded that hepatic lipidosis is a "serious disease."[22] The statement explained that hepatic lipidosis may be diagnosed if a liver contains more than five percent fat, but that livers of foie gras ducks contain up to sixty-five percent fat.[23] The statement concluded that birds having such distended, fatty livers "suffer[] from systemic effects of liver disease."[24] One veterinarian explained that "the cellular changes associated with hepatic lipidosis alter the ability of the liver to function normally, resulting in impaired animal health and, if left untreated, death."[25]

Ducks and geese with expanded livers often have difficulty standing and walking, and some are not able to stand at all. The enlarged livers also compress the birds' air sacs, severely compromising their breathing. At a certain point, impaired liver function typically results in "abnormal brain function caused by passage of toxic substances from the liver to the blood . . . causing seizures, opisthotonos and other signs of nervous system impairment."[26]

Foie gras producers are careful not to extend force-feeding for extra days, because very high mortality rates may result.[27] Even in the typical course of force-feeding, the mortality rate of force-fed ducks may be ten to twenty times higher than that of non-force-fed ducks during the two weeks before slaughter.[28] A recent statement on foie gras production adopted by over 1,600 licensed veterinarians states:

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[21] Ex. A, European Union Scientific Comm. on Animal Health & Animal Welfare, The Report of the European Union Scientific Committee on Animal Health and Animal Welfare on Welfare Aspects of the Production of Foie Gras in Ducks and Geese 39 (adopted Dec. 16, 1998, Brussells) (internal citation omitted) [hereinafter EU Scientific Comm.].
[22] Ex. B, Petition of N.Y. State Licensed Veterinarians Supporting Anti-Foie Gras Legis.
[23] *Id.*
[24] *Id.*
[25] Ex. C, Greg J. Harrison, DVM, DABVP, DECAMS Aff. 2 (May 25, 2006).
[26] *Id.*
[27] Ex. A, EU Scientific Comm. *supra* n. 21, at 41.
[28] *Id.* at 47. One study found that mortality during the two weeks before slaughter was 0.2%, for non force-fed ducks, compared with 2–4% for force-fed ducks. *Id.*

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Necropsies performed on birds from foie gras producers show lesions, including but not limited to: hepatic lipidosis; esophageal trauma secondary to insertion of the feeding pipes (granulomas, fungal and bacterial infections, ruptured esophagi); also fractured limbs, crop impaction, aspiration pneumonia, and ruptured livers.[29]

The European Union Scientific Committee on Animal Health and Animal Welfare, a permanent committee of the European Commission, concluded in 1998 that "because normal liver function is seriously impaired in birds with the hypertrophied liver which occurs at the end of force feeding this level of steatosis should be considered pathological."[30] A veterinary pathologist observed that hepatic lipidosis "is well documented in published literature, and recognized as a metabolic disease."[31]

The USDA has already "acknowledge[d] that the appearance of the livers of these birds would be characterized as affected by hepatic lipidosis."[32] The USDA further admitted that "the appearance of the foie gras livers, both grossly and microscopically, might be considered abnormal because it differs from a liver from a bird on a diet that contains less fat and carbohydrate," and that "the fatty changes are exactly those that would be expected due to the altered physiologic state of the bird."[33] However, the USDA has concluded that the altered physiological state of force-fed birds is not a "disease" because it is "normal," and in fact intended, for a force-fed bird to develop a distended, fatty liver.[34]

E. Foie gras products may enhance the onset of Secondary Amyloidosis, a disease fatal to humans.

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[29] Ex. D, Resolution to the Am. Veterinary Med. Ass'n's House of Delegates, Submitted by Petition, Position Statement on Force Feeding of Ducks and Geese to Produce Foie Gras; Ex. E, Teresa Barnato Aff. 2 (May 24, 2006) (stating, "I personally tabulated the return of over 1,600 such signed petitions, evidencing unequivocal support for the statements therein").
[30] Ex. A, EU Scientific Comm., *supra* n. 21, at 41.
[31] Ex. F, Robert E. Schmidt, DVM, PhD, DACVP Aff. (May 11, 2006).
[32] Ex. G, Letter from USDA, FSIS, to Humane Soc'y of the U.S. 1 (Aug. 27, 2009) (denying a petition requesting that the USDA ban foie gras products as adulterated).
[33] *Id.*
[34] *Id.*

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In addition to *being* diseased, foie gras products may *induce* disease. A 2007 study published in the Proceedings of the National Academy of Sciences found that protein fibers from foie gras enhanced the onset of Secondary Amyloidosis, a disease fatal to humans.[35] At least one prion/amyloid disease is known to be susceptible to cross-species transmission, as humans can contract a variant Creutzfeld-Jakob Disease from beef products derived from cows infected with Bovine Spongiform Encephalopathy ("Mad Cow Disease").[36]

F. Failing to disclose that foie gras products are derived from diseased birds misleads consumers, who expect products bearing a USDA seal not to come from diseased animals.

Consumers expect the USDA seal to indicate, at the very least, that food products come from wholesome and healthy animals. This is what the legal regime backing up the USDA seal, described above and below, is meant to ensure. Consumers are misled when marking on poultry products indicates consistent standards, but standards for foie gras differ markedly from those set for other poultry products.

1. Foie gras products show evidence of numerous conditions typically necessitating condemnation of poultry products.

FSIS regulations[37] require the condemnation of poultry carcasses or parts showing evidence of an abnormal physiological state,[38] septicemic or toxemic disease,[39] an inflammatory process,[40] general systematic disturbance,[41] or any disease characterized by the presence of toxins dangerous to the consumer.[42] All of these conditions are common in ducks and geese force-fed to produce foie gras.

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[35] Ex. H, Alan Solomon et al., *Amyloidgenic Potential of Foie Gras*, 104 PROC. NAT'L ACAD. SCI. 10998 (2007).
[36] Ex. I, Dr. Alexander Steven Whitehead Aff. 8 (July 12, 2007).
[37] 9 C.F.R. § 381.78.
[38] *Id.* at § 381.83.
[39] *Id.*
[40] *Id.* at § 381.86.
[41] *Id.*
[42] *Id.* at § 381.85.

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Abnormal physiological state: The USDA decided that hepatic lipidosis indicates an "altered physiological state," but that this state is "normal" in force-fed birds.[43] However, one of the foremost specialists on foie gras production in the world has concluded that hepatic lipidosis "can not be considered as a physiologically normal process."[44] Contrary to the USDA assertion, unnatural liver distension that may only be achieved through an artificial process of force-feeding is an abnormal physiological state.

Septicemic or toxemic disease: Septicemia, the presence of bacteria in the blood, is often associated with severe infections, and is common in force-fed birds. Numerous necropsies have found *Escherichia coli* (*E. coli*)[45] and *staphylococcus*[46] bacteria in the bodies of ducks removed from foie gras facilities. Impaired liver function contributes to the development of toxemia, the presence of toxins in the blood, often enough that a French manual for amateur breeders lists toxemia as one of the many "accidents and illness[es]" that can occur during the process of force-feeding.[47]

Inflammatory process: Enteritis, which is inflammation of the small intestine, usually appears at the end of the first week of force-feeding.[48]

General systematic disturbance: The negative effects of force-feeding, including hepatic lipidosis, fractured limbs, crop impaction, aspiration pneumonia, ruptured livers, displaced hock joints, and esophageal trauma caused by feeding pipes[49] all constitute systematic disturbances, because they have a significant and comprehensive impact on birds' health.[50]

Disease characterized by the presence of toxins dangerous to the consumer: Protein fibers from foie gras, which qualify as toxins, may induce fatal Secondary Amyloidosis in

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[43] Ex. G, Letter from USDA, FSIS, to Humane Soc'y of the U.S., *supra* n. 32, at 1.
[44] Ex. J, Dr. Yvan Beck et al., Report on Force Feeding by Belgian Experts 21, presented to the Permanent Council of the European Convention on the Protection of Farmed Animals (1996).
[45] Ex. K, Meghan Beeby Aff. 10 (May 22, 2006); Ex. L, Dr. Holly Cheever, DVM Aff. 7 (May 8, 2006).
[46] Ex. K, Beeby Aff., *supra* n. 45, at 10; Ex. M, Letter from Dr. Wendy Thatcher, DVM (Nov. 15, 1991), and related animal pathology reports from the N.Y. State Coll. of Veterinary Med. 3–4 (Dec. 6, 1991).
[47] Ex. N, Antoine Comiti, Rebuttal to the Claim by the INRA Researchers that Force-Feeding is Not Harmful to the Bird's Health and Liver 23 (May 2006) (citing Jean-Claude Péreiquet, *Les Oles et les canards* ("Ducks and Geese") 105 (Éditions Rustica 1999) (cautioning that force-fed animals suffer from anoxemia, toxemia, cirrhosis of the liver, candidosis, feeding tube injuries, and internal muscular hemorrhages)).
[48] Ex. J, Dr. Beck et al., *supra* n. 44, at 41.
[49] Ex. D, Barnato Aff. *supra* n. 29, at 4; Ex. J, Beeby Aff. *supra* n. 45, at 10.
[50] *See* Ex. B, Petition of N.Y. State Licensed Veterinarians Supporting Anti-Foie Gras Legis., *supra* n. 22 (stating that birds with hepatic lipidosis "suffer[] from systemic effects of liver disease").

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humans.[51] Cross-species transmission of Mad Cow Disease, another prion/amyloid disease, has already been demonstrated.[52]

2. The USDA's inconsistent treatment and marking of poultry products misleads consumers, contravening the PPIA.

While not in the context of the PPIA specifically, the U.S. Supreme Court has reaffirmed a core principle of labeling law: that language may mislead consumers through omissions as well as affirmative statements.[53] For example, the Court has stated that "warning[s] or disclaimer[s] might be appropriately required . . . in order to dissipate the possibility of consumer confusion or deception."[54] The Court has also noted that omitting information material to a consumer's decision to engage in a business transaction may make "the possibility of deception" "self-evident."[55]

In selecting poultry products, consumers rely on the USDA's seal for consistent assurance of material qualities, such as wholesomeness and freedom from disease. Unable to ascertain these qualities on their own, consumers must rely on the packages' marking or labeling in order to make purchasing decisions. Here, omitting the material fact that foie gras products bearing the USDA seal are derived from diseased birds misleads consumers, compromising their purchasing decisions.

Consumers have every reason to believe that the USDA would refuse to stamp its approval on parts of a diseased bird. Furthermore, the USDA typically ensures that any organ or part of an animal that is diseased is removed and condemned, even if the rest of the animal is permitted to enter the food supply.[56] However, USDA permits its approval to appear on foie gras, a diseased poultry product being offered to consumers for human consumption. Such inconsistency in treatment contravenes the PPIA, because it misleads consumers.

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[51] Ex. H, Solomon et al., *supra* n. 34, at 10998.
[52] Ex. I, Dr. Whitehead Aff., *supra* n. 36, at 8.
[53] *E.g. In re R. M. J.*, 455 U.S. 191, 201 (1982); *Zauderer v. Office of Disciplinary Counsel of Sup. Ct. of Ohio*, 471 U.S. 626, 651–53 (1985).
[54] *In re R. M. J.*, 455 U.S. at 201.
[55] *Zauderer*, 471 U.S. at 652–53.
[56] 9 C.F.R. § 381.72.

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G. Labeling foie gras products as derived from diseased birds corrects the public misperception that products bearing the official USDA mark do not come from diseased animals.

Presently, members of the public mistakenly believe that the USDA does not place its seal of approval on products from diseased animals or on diseased parts of animals. That is why the USDA has publicized the importance of the accurate use of seals, and consumers' reliance on those seals, stating that "[t]he mark of inspection gives consumers confidence that the meat, poultry and processed egg products they are about to enjoy are safe and wholesome."[57]

Thus, the USDA should decline to attach its official mark to foie gras products not labeled as derived from diseased birds. Withholding the USDA seal from unlabeled foie gras products is necessary to ensure that marking and labeling on those products is no longer misleading.

IV. Conclusion

As described herein, foie gras products derived from diseased birds now bear the USDA's seal of approval. Consumers expect the USDA to approve only products from non-diseased animals, so stamping foie gras products with the USDA seal without disclosing that they are derived from diseased birds misleads consumers, contravening the PPIA. Foie gras products are unlike other American poultry products, because they alone are produced by inducing disease, and consumers should have access to this information when making purchasing decisions.

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[57] *Supra* n. 5.

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V. Certification

The undersigned certifies that, to his best knowledge and belief, this petition includes all information and views on which the petition relies, and that it includes representative data and information known to the petitioner that are favorable to the petition.

Carter Dillard
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EXHIBITS

EXHIBIT A	European Union Scientific Commission on Animal Health & Animal Welfare
EXHIBIT B	Petition of NY State Licensed Veterinarians Supporting Anti-Foie Gras Legislation
EXHIBIT C	Greg J. Harrison DVM, DABVP, DECAMS Aff 2 (May 25, 2006)
EXHIBIT D	Resolution to the Am Veterinary Med. Ass'n's House of Delegates
EXHIBIT E	Teresa Barnato Aff 2 (May 24, 2006)
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Welfare Aspects of the Production of Foie Gras in Ducks and Geese

Report of the

Scientific Committee on Animal Health and Animal Welfare

Adopted 16 December 1998

Contents of the Report

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REQUEST FOR AN OPINION.

The Scientific Committee on Animal Health and Animal Welfare is asked to report on the animal welfare aspects of the production of foie gras using ducks and geese.

INTRODUCTION

There is widespread belief that people have moral obligations to the animals with which they interact, such that poor welfare should be minimised and very poor welfare avoided. It is assumed that animals, including farm animals, can experience pain, fear and distress and that welfare is poor when these occur. This has led to animal welfare being on the political agenda of European countries.

Legislation varies, but E.U. member states have ratified the Council of Europe's Convention on the Protection of Animal kept for Farming Purposes. Article 3 of that Convention states that " Animals shall be housed and provided with food, water and care in a manner which, having regard to their species and their degree of development, adaptation and domestication, is appropriate to their physiological and ethological needs in accordance with established experience and scientific knowledge" (Council of Europe, 1976).

In addition to political debate, the amount of information based on the scientific study of animal welfare has increased. Scientists have added to knowledge of the physiological and behavioural responses of animals and philosophers have developed ethical views on animal welfare. Nevertheless, all agree that decisions about animal welfare should be based on good scientific evidence (Duncan, 1981, Broom, 1988 b).

Scientific evidence regarding the welfare of ducks and geese in relation to foie gras production is gathered together in this report. In chapter 1, different definitions of animal welfare are presented, the four main indicators of animal welfare are discussed and the importance of combining results from several indicators is emphasised. In the second chapter the extent of production of foie gras is described and in the third, practical aspects of production are summarised. Chapter four concerns the behaviour of geese and ducks in relation to force feeding or "gavage". The consequences for the birds of force feeding are described in chapter five. The remaining chapters concern the likely socio-economic consequences of any changes whose aim is to improve the welfare of the birds, suggestions for future research and conclusions. Finally, there is a list of references quoted in the report.

1 WELFARE DEFINITIONS AND MEASUREMENT

1.1 Definitions of welfare

The terms " welfare " and " well-being " (Fraser, 1995, Hughes, 1989), are both used when referring to the state of animal. In this report, the term " welfare " and not " well-being "will be used. In discussions about animal welfare several definitions and descriptive statements have been used. Some of the more commonly quoted include:

1. Brambell report (1965): "Welfare is a wide term that embraces both the physiological and mental well-being of the animal. Any attempt to evaluate welfare, therefore, must take into account the scientific evidence available concerning the feelings of animals that can be derived from their structure and function and also from their behaviour".

2- Lorz (1973): "Living in harmony with the environment and with itself, both physically and psychologically ".

3- Wiepkema (1982): " The inadequacy of the programmes performed to control relevant aspects of the Umwelt, or the permanent failure of any behaviour, must cause severe feelings of distress. In this period the animal really suffers and its well-being is at stake ".

4- Broom (1986, 1996): " The welfare of an individual is its state as regards its attempts to cope with its environment ". "The origin of the concept is how well the individual is faring or travelling through life. The state can be good or poor but, in either case, there will often be feelings associated with the state, which we should try to measure, as well as using more direct measures."

5- " Welfare is solely dependent on what animals feel ", (Duncan and Petherick, 1989).

6- " Welfare is mainly dependent on what animals feel " (Dawkins, 1990).

The first of these statements are rather descriptive. The second, referring to the animal being in harmony with its environment, although commonly quoted is not very helpful in scientifically assessing the welfare of animals under different conditions. Others refer to adaptation to or control of the environment by the animal (3 and 4) and seem more operational because they present opportunities for measurement. Some are specifically concerned with the subjective experiences of the animal (5 and 6). However, there is general agreement amongst scientists about the overall meaning of the term welfare. The more effort the animal is putting into coping, or the greater the biological cost of responding, the worse the animal feels and the poorer its welfare. In most cases, the term welfare is used to cover a continuum from very poor to very good welfare. When the animal is coping well there are usually good feelings and welfare is good (Broom, 1996; Duncan, 1996; Moberg, 1996)

1.2 Assessment of Welfare

Before describing the health, production, physiological and ethological indicators of animal welfare, it is necessary to give a general picture of why these indicators have been selected by researchers. This is best achieved by outlining where they fit into the complex of interactions between the animal and its environment. In the course of evolution every animal species has adapted to an environment in which it is able to regulate its internal state and to survive and reproduce. Regulatory systems in animals consist of the detection of changes in that environment and responses to these changes which allow the animal to keep internal and external conditions at an optimal level. In other words, the animal tries to control its environment by using various coping mechanisms. Feelings play an important role in these coping mechanisms, as do behavioural, physiological, biochemical and immunological responses.

- 1.2.1 Health indicators

Health, which refers to the extent of any disease and injury, is an important part of welfare and an important criterion in the assessment of the quality of life of animals. A range of the measures which are used in welfare assessment are indicators of health. These include clinical signs of disease and anatomical, physiological and immunological signs that the individual is having difficulty in coping with its environment or is failing to cope. If some immunological weakness or abnormality means that the individual would be more likely to succumb to pathogen challenge, injury, etc. then the welfare is more at risk than in an animal which does not have this weakness or abnormality. In the same way, inadequacies of physiological or anatomical function, which have the same kinds of effects, are indicators of poor welfare. In some cases, the poor welfare can be recognised by measurement in basal conditions, in others a challenge is needed to reveal it, and it is increased mortality or morbidity which indicates the severe problem..

The term pathological is used for a body condition in which there are malfunctioning organs or systems with clinical or subclinical effects.

A disease is by definition a pathological state where the causal factors are often clearly identified and the clinical signs well defined. Pathogenic microorganisms and environmental factors are the most common causal factors for disease, although genetic factors must not be neglected. Environmental factors can precipitate the development of a disease process in the absence of specific pathogens. Most diseases are usually accompanied by obvious clinical and biochemical manifestations and the specific structural changes that affect a diseased organ can be recognised at autopsy. There is a general consensus that such diseases lead to suffering. However, not all diseases are always easy to recognise. A disease that develops in the absence of well identified causal factors and lacks anatomopathological features is called a functional disease (e.g. irritable bowel syndrome). Functional diseases are most often accompanied by barely visible clinical signs, and cannot be readily diagnosed unless abnormal changes in the affected physiological function are evidenced by appropriate clinical biochemistry methods. Deviations from normality do not necessarily imply suffering. In addition, there are functional diseases which occur without any evident biochemical abnormality but are accompanied by painful symptoms. This is likely to be the case for functional gastrointestinal disorders. Many functional diseases are reversible. It is not always easy to differentiate a functional disease from the preclinical stage of a slowly progressing disease, specially in an organism in which the duration of life is limited by the production process.

Injuries are painful when they occur in innervated bodily areas. In other parts of the body, they can lead to deformations and deformities which can be unaesthetic but are not necessarily painful. They may result in poor welfare in other ways.. The occurrence of injury is an indicator of the constraints exerted by the environment on the species specific behavioural patterns of farm animals. Alterations in the skin and feathers do not necessarily compromise physical health, at least on the short term, but indicate that the environment does not allow the normal sequencing of body care activities.

From an epidemiological perspective, health indicators of animal welfare must also be studied with a broad population perspective, since frequently occurring problems must be considered by society to be more alarming than rare events of the same problem. Especially for farm animals, monitoring, recording, preventing and controlling disease take place routinely at the herd and higher population levels.

In a group of animals, such as a flock, house, herd or any other population unit, the amount of poor welfare caused by disease is a function of its incidence, severity and duration, as described by Willeberg (1991).

This relationship has a number of important consequences for practical use and proper interpretation of welfare-associated disease observations. The points relate to the source of available data on disease occurrence, which in practice concentrate around: frequency of treatment, mortality measures and frequency of lesions at slaughter.

Data on frequency of treatment for diseases are rarely consistently recorded by the farmer, who most often carries out the treatment of flock animals. In some countries treatment data do exist for dairy cattle, at least for treatments carried out by the veterinarian. In many field trials of new production systems such treatment data are collected (Willeberg, 1993, 1997). Measures which are indicators of the number of treatments are the amounts of drugs purchased or used in the production, but such information is not often published nor otherwise generally available, and it is also difficult to specify in which animals and for which conditions they were used.

Data on mortality can be found, or are legally required, in some production systems. Mortality data for regional or national populations may also be used to illustrate time trends in mortality of farm animals (Agger and Willeberg, 1991). In assigning welfare importance to mortality figures it is obvious that deaths are indicators of severe welfare problems, but information on the causes of death as well as an estimate of the duration of the condition before death should also be obtained in order to allow for a complete evaluation of a disease-associated welfare problem.

The frequency of lesions at slaughter is a prevalence estimate, not an incidence, and therefore it is in itself a function of the duration of the condition. Furthermore, causes of chronic conditions frequently seen at slaughter are often also determinants of the degree of pain associated with the condition, e.g. a floor surface which gives rise to frequent foot-lesions may also tend to magnify the pain of standing and moving in affected animals. However, there may not be proportionality between the prevalence of lesions at slaughter and the magnitude of the associated welfare problem which is particularly important in interpretations of comparative studies of different production systems (Willeberg, 1991).

1.2.2 Production indicators

Under controlled conditions relative changes in the productivity of individuals may indicate changes in welfare. A simple conclusion is that a sudden drop in productivity of an individual from a high level to a low level probably indicates a welfare problem. If young animals are not able to grow or if mature animals are unable to reproduce despite good opportunities to do so then their welfare is poor. Hence these measures can be used to identify particularly poor welfare. Welfare is also poor if a housing and management system results in a lower life expectancy, in the absence of human interference, than that which would normally be expected in such animals.

One of the main problems in using productivity as a measure of welfare is that, to the farmer, productivity may mean the average production of a flock, the production per unit of food intake, or the economic return per unit of capital or per unit of labour rather than the productivity of the individual (Duncan and Dawkins, 1983). No economic measure should be used when assessing welfare and, to be valid, assessment of production must be based on measures from individual animals, not flocks. Comparisons between individuals may be difficult because production is influenced by the strain and age of the bird, and can be manipulated by management strategies, such as the lighting programme or the nutritional content of the feed. A high level of production may even predispose the bird to production diseases and so increase the risk of poor welfare. As with health, good production does not necessarily indicate good welfare.

1.2.3 Physiological Indicators

The most frequently measured physiological indicators are those associated with stress responses, especially the activity of the hypothalamo-pituitary-adrenocortical (HPA) and the sympathetic axis. In birds, this has typically involved measuring heart rate, glucocorticoid concentrations, adrenal gland weight and responses to ACTH challenge.

However, as with the other measures, care must be taken in interpreting the results. Physiological responses to short-term stressors may be different from responses to long-term stressors because the system adapts when stress is prolonged. Furthermore, some of the adrenal responses can be elicited by positive experiences such as excitement. It is therefore too simplistic to equate an increase in adrenal activity with poorer welfare. Moberg (1996) argues that instead of just measuring the adrenal response we should be measuring the consequences of the stress, such as suppression of an immune response and failure to ovulate. While there are difficulties in interpreting measurements of HPA activity, entering a prepathological state clearly has an impact on the welfare of the animal.

Considerations when measurements of glucocorticoid levels in body fluids are made in order to assess animal welfare are: 1. the duration of the response; 2. the extent of daily fluctuations in normal adrenal cortex activity; 3. the variation in the magnitude of the response to different kinds of problems. Some of these problems in interpretation of adrenal cortex responses are discussed by Freeman (1985), Mason and Mendl (1993), Broom and Johnson (1993) and Zulkifli and Siegel (1995).

In most domestic birds, when an animal is disturbed sufficiently by an event for an adrenal cortex response to occur, the elevation of corticosterone in the blood takes at least two minutes to become evident (Lagadic et al., 1990). It rises to a peak after around 15 minutes and then decreases (quail: Launay, 1993; mulard duck: Noirault et al., in press). Hence the effect of short term physical experience such as handling or transport (Remignon et al., 1996) or psychological experience such as social disturbance or fear inducing stimulus (Siegel, 1982; Mills et al., 1993; Launay, 1993) can be assessed readily by measuring the magnitude of corticosterone increase in blood or other body fluids. During certain activities, such as e.g.

courtship and mating, adrenal cortex activity may increase but this would not necessarily be interpreted as indicating poor welfare.

When animals expect to be able to feed, or are frustrated because of absence of food, increased adrenal cortex activity often occurs but during ingestion of food, adrenal activity may well decline. Indeed, in situations where high levels of metabolism or general activity are undesirable, for example when the ambient temperature is high, increases in glucocorticoid production may not occur or may be actively suppressed (Broom and Johnson 1993). Such effects are clearly adaptive.

In some circumstances animals show a greater response to ACTH after experiencing difficult conditions over a long period. Other difficult conditions, however, do not elicit repeated adrenal cortex activity and do not result in elevated cortisol production following ACTH challenge (Ladewig and Smidt, 1989) If the conditions are prolonged and very severe in their effects, adrenal function may be impaired and a reduced response to ACTH challenge may result. Hence whilst an increased cortisol response to ACTH challenge indicates poor welfare, the lack of such a response does not necessarily indicate that the conditions posed no problem for the animal.

Endogenous diurnal fluctuations in glucocorticoid levels have to be taken into account when assessing the effects of an experimental treatment (Ladewig 1989). Another factor that has to be considered is that the plasma concentration of glucocorticoids is not only dependent upon the rate of hormone secretion, but also upon its rate of clearance from the blood. Elevations of glucocorticoids in response to different conditions at a particular time are seldom prolonged for more than 30 to 60 minutes after that time. Hence single blood samples usually reveal little about chronic problems and a sequence of samples must be taken at short intervals in order to gain information about such problems. Also, the nature of the aversive stimulus may influence the animal's reaction to it, including the extent of glucocorticoid secretion as a component of that reaction (Mason and Mendl 1993). Increased glucocorticoid levels have been associated with states of fear and anxiety, while pain does not always affect plasma glucocorticoid concentration (Bateson, 1991). Prolonged pain can result in reduced plasma glucocorticoid concentration (Lay *et al*,. 1992). Housing conditions may intermittently elicit adrenal cortex responses but random samples may miss these. Regular sampling of blood, using cannulated animals gives more reliable information than infrequent measures of resting levels but due to their small size and the constraint imposed by the canula this is rarely done in birds. Breed and individual differences also exist in the activity of the adrenal cortex (Mills et al., 1993; Launay, 1993).

A final but most important point concerning the use of measurements of adrenal cortex activity is that the sampling itself causes an adrenal cortex response. The sampling disturbance effect will commence as soon as any approach to the animal is made in all but animals thoroughly habituated to human proximity. However the response takes two minutes to be evident and it has been shown that hens are not affected by the blood sampling of birds of the same or neighbouring cages (Lagadic et al., 1990) .

As with corticosterone, heart rate is influenced by factors other than fear or anxiety. The level of heart rate reflects the animal's general metabolic demand, and is also influenced by circadian rhythms. In order to avoid conflicting and equivocal results it is important to distinguish between metabolic and emotional effects and to ensure that the measurement itself does not cause much disturbance to the animal (Mills et al., 1985; Broom and Johnson, 1993). Heart rate changes provide useful information about the effects of short term problems on the animal, but the measure gives little information about the long term effects. It is necessary to complement measurements of heart rate with other indices such as those pertaining to behavioural activity. An alternative to heart rate is the measurement of shank temperature which drops during the vasoconstriction following adrenal secretion.

All the cited measures are of short term (minutes to hours) stress reactions. In birds calculation of the heterophil/ lymphocyte ratio allows some measurement of longer term (hours to weeks) stress (Gross and Siegel, 1983 ; Mills et al., 1993).

- 1.2.4 Ethological Indicators

The advantages of ethological indicators, that are studies of animal behaviour, are that they are non-invasive and changes may precede those of other indicators. Ethological studies are of three main types.

a) In the first type, birds are placed in the environment under investigation and their behaviour is compared with that of birds either under feral conditions or in an environment assumed to be ideal. This approach is useful because it shows which behaviours are changed by the environment or treatment under investigation, so that further scientific study of these can be carried out. It also provides information about how birds choose to allocate resources in good conditions. However the problem with this approach is that it is not immediately obvious whether a particular behaviour, or change in behaviour, is an indication of regulatory disturbance or failure, or whether it is an appropriate adaptation to a change in environment. When the behaviour patterns have obvious detrimental effects, as is the case for feather pecking (Blokhuis, 1989), the interpretation of results is easy, but in other cases it is not. For example, Fölsch (1980) found differences in locomotion and acoustic behaviour of hens placed in different environments. But to use such parameters to demonstrate poor welfare, it must first be shown that these changes indicate frustration or some other problem.

b) The second method is to give birds access to more than one environment, resource, or opportunity for behaviour and assume that they will choose that which is in their best interest (Hughes and Black, 1973; Dawkins, 1976; Rutter and Duncan, 1991; 1992). Closely related to these choice experiments are operant conditioning techniques in which birds have to work to obtain, or to avoid, some aspect of their environment (Dawkins, 1983; Meunier-Salaun and Faure, 1985; Lagadic, 1992). Also, demand functions can be generated by making animals perform a variable amount of work in order to obtain the same amount of reward (Dawkins, 1983; Ladewig and Mathews, 1996). In all of such studies, the strength of preference should be assessed.

Poorly designed preference tests have been criticised by Duncan (1978) and operant conditioning is considered by Dawkins and Beardsley (1986) to be a problematic way of measuring animal motivation. However, others consider these to be the most powerful tools available for studying the needs of animals, to show certain behaviour or to obtain certain resources even if some caution should be taken in the interpretation of results (van Rooijen, 1982, Ladewig and Matthews, 1996).

c) The third type of ethological method used to assess welfare is to observe behaviour in experimental situations and compare their behaviour with the behaviour in the environment under study. In a situation where the animals do not appear to be coping, or cope only with great difficulty, several behavioural changes may be apparent, some of which may be called abnormal or stereotypic (Wiepkema, 1985). Although there is some controversy about the exact meaning of stereotypies (Dantzer and Mormède, 1981; Wiepkema, 1987; Savory, 1989; Cooper and Nicol, 1991; Mason, 1991), it is generally thought that suffering occurs before stereotypies are established and animals showing stereotypies are having difficulty in coping so their welfare is poor.

When birds are fearful, they may show retreat, avoidance behaviour or freezing behaviour as well as physiological responses. Stereotypies shown by birds including: head-shaking (Levy, 1944) the plucking and carrying of their own feathers (Hinde, 1958), route tracing (Keiper, 1970), pacing (Duncan, 1970) and spot-pecking (Staddon and Simmelhag, 1971).

The apparent simplicity of ethological studies can lead to them being misused. However, as with physiological indicators, when used appropriately ethological indicators can be a sensitive measure of animal welfare.

1.3 Combining Results from different indicators

When faced with one kind of difficulty, an individual may show a measurable response, such as increased adrenal activity, but other kinds of difficulty may elicit no adrenal change at all. Similarly, increased levels of abnormal activity, an overall reduction in responsiveness, a fever response, an increased T-cell activity, a loss of detoxification ability or a suppression of growth may occur in response to one problem but not in response to another. Hence it is agreed that there is no single indicator of animal welfare and that to get the best assessment, several different measurements have to be taken (Broom, 1986; Broom and Johnson, 1993). In some cases, all indicators, be they health, production, physiological or ethological, point in the same direction and the interpretation is clear. On other occasions there are conflicting results (Mason and Mendl, 1993). In each case a balanced overall assessment of welfare must be made.

Another problem in the evaluation of animal welfare is the lack of knowledge of how animals experience, for example, the states of disease, conflict or frustration. Are some states more important from a welfare point of view than the others? These questions are difficult to answer with our present knowledge of veterinary and ethological science. An alternative view, therefore, is that of Fraser (1995) who proposed that instead of attempting to "measure" animal welfare, the role of science should be to rectify and prevent all welfare problems. Rushen and de Passillé (1992) acknowledged the problems in measuring welfare and proposed that criteria for assessing welfare can be divided into design criteria, which specify what must be included in an animal's environment to promote good welfare e. g. space allocations etc., and performance criteria, which indicate what parameters of the state of an animal indicate good or poor welfare e.g. production performance, physiological indicators of stress etc. They propose that housing can be assessed using an optimum mix of these two criteria.

1.4 Summary

Despite there being several definitions of animal welfare, scientists agree on many of the basic principles. For example, many agree that welfare particularly concerns what an individual animal feels, but think that the techniques to measure feelings are not very well developed at the present time. Techniques to measure the effort an animal is putting into coping with a situation are better developed and, since this should be correlated with feelings, it is argued that current research should concentrate on these measures as indicators of welfare. The most commonly used welfare indicators are measures of health, production, physiology and behaviour. Any one of these indicators may be used on its own to indicate poor welfare, but an integrated (Smidt, 1983) or holistic (Simonsen, 1996) approach gives a better indication of the effort the animal is putting into coping and hence the biological cost to the animal of responding. With regard to assessing housing for animals, recent thinking supports a balance between design and performance criteria and focusing on specific welfare problems. Hence the welfare of ducks and geese in relation to the housing and the procedures which are used during force feeding can be assessed.

2 THE ORIGINS AND DISTRIBUTION OF FOIE GRAS PRODUCTION

2.1 The products

The "foie gras" (or "fat liver") products derived from the force feeding of ducks and geese are defined by the following European and French regulations.

Regulation Nf 1538/91 of the commission dated the 5th of June 1991 (JO N°L 143, 7th of June, P. 11; JO N°L233, 22nd of August 1991, p. 31) defines norms for the characteristics of the products of different birds. In particular force fed ducks and geese are defined by the minimal weights of their livers, 300g for ducks and 400g for the geese.

A French regulation (Décret N° 93-999 du 9 Août 1993 relatif aux préparations à base de foie gras) defines the different types of products prepared with foie gras. All these preparations involve some percentage of fat liver (from 100% to 20%). Another text, "Arrété du 8 avril 1994 relatif aux méthodes officielles d'analyse des préparations à base de foie gras", complements the first one by describing methods for the analysis of the different " préparations". Methods for determining the percentage of fat liver and the size of the pieces of the liver are given. A histological analysis is also described and the text defines as not acceptable products where the hepatocytes do not include fat globules, a high proportion of perivascular tissue, tissues other than fat liver from ducks and geese and a high proportion of tissue with lesions.

The different products are described as follows:

1 - "foie gras entier" (whole fat liver) the liver is sold as a whole,
2 - "foie gras" parts of liver are used but the livers do not have to be in one piece,
3 - " bloc de foie gras" only fat livers are used but they are processed by mechanical devices and chunks of liver are not visible,
4 - "parfait de foie" includes at least 75% of fat liver processed by mechanical devices,

5 - "médaillon de foie" and "pâté de foie" product with at least 50% of fat liver. This fat liver is in chunks or is mechanically prepared and is clearly set in the centre of the preparation with products from other origins on the outside.

6 – "galantine de foie" product with 50% of fat liver mixed with stuffing.

7 – "mousse de foie " product with 50% of fat liver mixed with stuffing and presented as a " mousse".

8- "produits au foie gras" products with foie gras which contains at least 20% of fat liver

Other products exist which include livers from non force fed ducks and geese, in particular "pâté" and "mousse".

A new nomenclature for those products was defined at the European level and published in 1995 (nomenclature PRODCOM). The changes in this production are thus difficult to determine on a long term basis. However the general trend is of an increase of production in France during the last fifteen years (from 5900T in 1990 to 10670T in 1996; CIFOG, 1996) and a decrease in imports to France (from 2620T in 1990 to 1800T in 1996). The quantity processed by the industry increased from 4450T in 1990 to more than 6700T in 1996. The other part of the production is processed and some is sold directly at the farm level.

In 1996, 6200T of 100% foie gras products (products 1 to 3) and 700T of the other foie gras products (products 4 to 8) were sold by the food industry at prices of around 225FF/Kg and 155FF/Kg. 13000T of non foie gras "pâté and mousse" were produced in 1996 at a mean price of approximately 32F/Kg. These differences in prices are related also to the differences in the timing of the consumption. Foie gras products are sold usually towards the end of the year whilst «pâté de foie de volaille » is sold all year round. On average, each family in France buys foie gras products for 140FF on 1.7 occasions and "mousse " and "pâté" for 37FF in 2.5 occasions every year.

2.2 Origins and species

Some geese have been reared since ancient times in such a way that an especially fatty liver could be obtained from them. There is reference to this practice in the satires by Horace

(Book ii, Chapter pIII) and in the statuette of a fattened goose more than 4500 years old from the Ancient Egyptian Empire exhibited at the Louvre. Other authors such as Herodotus and Homer have also described practices corresponding to force feeding in their works (Carrère, 1988). The feeding of geese according to the method carried out in Gascogne, south-west of France was described as early as 1619 by Olivier de Serres, "et jecur anseris albae pastum ficis pinguibus" the translation of which is "and the liver of a white goose fattened with oily figs".

The fat liver, internationally called "foie gras", was produced traditionally from geese. However in recent years there has been a widespread change to the use of ducks rather than geese, mainly for financial reasons. The change in France has been dramatic from an exclusively goose production in the 1950s to a current production of liver, 94% (9700 tonnes of foie gras) of which is from ducks and only 6% (600 tonnes) from geese.

The duck chosen for foie gras production is a hybrid between the muscovy duck (*Cairina moschata*) and the domestic duck (*Anas platyrhynchos*). There is an important sexual dimorphism in muscovy ducks, the adult male weighs between 4.5 and 5 kg while the adult female weighs between 2.2 and 3 kg. Farmers reported that during force feeding, these animals were too nervous and at the end of the force feeding period, their fatty liver had a tendency to lose fat by melting. For all these reasons, these animals were crossed with domestic ducks. A male muscovy duck is crossed with a female of a breed such as the Pekin duck. The product is a sterile hybrid, the so-called mulard duck. The males are used for foie gras production and the females are raised for meat consumption.

Geese (*Anser anser*) which are kept for force feeding are of specific strains: oie du Gers and oie grise du sud-ouest. These strains are selected because of the capacity of the animals to produce fatty livers.

2.3 Production in France

In France, by tradition, force feeding was mainly carried out in Alsace and in the south west of the country, including Aquitaine and Midi-Pyrénées areas. These areas still provide 80% of the total production. In the last 10 years, foie gras production has developed in a second area in the western part of the country (Pays de Loire and Bretagne) where the production represents nowadays 18% of the total French production. Some force feeding is currently practised in all geographical regions.

After a considerable increase in production over ten years, production levels have begun to stabilise with an increase of 7% between 1994 and 1995. In 1995, the French production of 10385 tonnes was supplemented by 2850 tonnes of imported foie gras, which is a decrease of 17% from the 1994 level, (CIFOG 1996). In order to obtain this production in France, 789,000 geese and 18,395,000 ducks were bred and force fed in 1995. The number of ducks kept for this purpose showed an increase of 7.6% between 1994 and 1995 but there was no increase between 1991 and 1995 in the number of geese kept.

In 1995, 342 tonnes of foie gras, as a raw product were exported and 12 893 tonnes were used in France. Of this 6 394 tonnes were transformed by food industries and 6 499 tonnes were used in restaurants or for private consumption. 380 tonnes of processed foie gras were exported in 1995 in particular to: Switzerland (73 tonnes), Belgium and Luxembourg (64 tonnes), Spain (43 tonnes). United-Kingdom (37 tonnes), Germany (32 tonnes), Japan (27 tonnes) and Netherlands (22 tonnes).

Meat production which is associated with the production of foie gras is estimated as nearly 28,000 tonnes. This corresponds to 10,000 tonnes of fillets (magrets), 10,000 tons of thighs (so called " cuisses à rotir ou à confire "), 4,500 tonnes of " manchons ", 1,200 tonnes of " aiguillettes ", 1,500 tonnes of gizzards and 450 tonnes of hearts.

2.4 Production in Belgium

The annual production was estimated as 40 tonnes in 1993. It had increased to 48 tonnes in 1995. The number of animals involved in this production was 98 000 ducks in 1995 (90 000 in 1993) and 2 000 geese in 1995 (same number in 1993). The annual consumption is of 200 tonnes.

2.5 Production in Spain

The annual production was estimated as 34 000 animals in 1990. It gradually increased to an average of 45 000 animals in 1995 and an estimated 55 000 animals in 1996.

3 THE PRACTICE OF REARING AND FORCE FEEDING

3.1 Management before the force feeding period

After hatching, the mulard ducks are kept in a building on straw for 4 weeks. They are then allowed to live outside, on grass for some weeks.

In contrast to certain other species, there is no crop in the goose and in the duck but the oesophagus can become dilated. The preparation of the animal is carried out in order to emphasise this dilation. Prior to force feeding, the bird is prepared for the various manipulations in two phases. In phase one from the third week onwards, the bird is subjected to training that is designed to dilate the oesophagus. This is achieved by grass ingestion for example. Such preparation makes it possible for the bird to receive a large quantity of food very rapidly, which will occur during the force feeding period.

In phase two, the bird is subjected to a period of rapid muscle growth (Bénard, 1992). During this period, which generally lasts about four weeks, the bird receives a large quantity of food which is fed ad libitum. This results in oesophagus dilation and progressively leads to the half-fatted state. The ration is distributed as a mash and is at this stage usually composed of maize 20%, wheat 53%, soya cake 19%, mineral and vitamin supplement 8%. In this diet, the metabolisable energy is around 680J. The composition is as follows: proteins 16.5%, starch 47.9%, cellulose 2.7%, fat 2.1%, lysine 0.78%, methionine 0.37%, tryptophan 0.20%, phosphorus 0.72%, calcium 1.16%, chloride 0.20%, sodium 0.16%. The dry matter is around 87.5% and ash is 6.3%. This diet is provided when the birds come in from the field. The periods when the birds are allowed to go out are then progressively reduced so as to condition them to the restraint associated with the force feeding period.

3.2 Management during the force feeding period.

During this period there is forced daily ingestion, for 12 to 15 days for ducks and 15 to 18 even 21 days for geese, of a large amount of energy-rich food, with a high carbohydrate and fat content and an uneven amino acid balance: lysine 0.28%, methionine 0.22%, tryptophan

0.07%, leucine 1.28%, arginine 0.49% (Larbier and Leclercq, 1992). Animals receive two meals per day (ducks) or three meals per day (geese).

The basic feed is maize which is usually boiled and mixed with fat principally to facilitate ingestion. It is administered by force using a funnel fitted with a long tube consisting of an auger or pneumatic system that forces the maize into the oesophagus. The amount is fixed so as to ensure that the crop-like area is full. Efforts are made to avoid any tearing or splitting of the oesophagus by the movements of the tube or the amount of food inserted.

Various parameters are of fundamental importance during this period. Water must be continuously available. Many farmers make the water alkaline by adding sodium bicarbonate. The maize used is at least one year old so that the starch is more easily assimilated. Some authors have shown that, based on the increase in body weight and liver weight, the administration of grain maize is preferable to that of a fluid paste obtained by grinding the maize in water. This may be explained by better assimilation of the starch, due to the slowing down of grain transit. Finally the addition of lactic ferments limits the multiplication of enterococci, and thus the risks of enteritis associated with poor digestion (Bénard, 1992).

To deliver the food, an auger (endless screw) is generally used. The auger is contained within the feeding tube. It is moved either by hand in traditional units or with an electric motor. With such systems, used for 30% of the birds, it takes between 45 and 60 seconds to deliver the meal. In larger units, pneumatic devices are used. They allow the farm worker to deliver the same quantity of food in 2-3 seconds. Such a system is connected through a computer which helps to determine the amount of food to deliver to each bird on the basis of the body weight and the amount of food which was delivered during the preceding meals.

Whether force feeding is to be carried out using an auger or using a pneumatic device, the bird must first be restrained and positioned by a person. In order to make catching the bird easier, the ducks or geese are either kept in groups in a small pen or cage or in a wire or plastic cage holding only one bird. Most ducks are now kept in cages of a size which does not allow the bird to turn around or stretch its wings. The head protrudes through a hole in the front of the cage roof. 20% of the ducks and all of the geese are kept in groups.

The person who will commence the force feeding grabs the neck of the bird, retrains the wings if the bird is in a pen, draws the bird towards the feeding pipe, thrusts the 20-30 cm long pipe down the throat of the bird and initiates the food pumping procedure. When food delivery is completed, the pipe is removed. The insertion and removal of the pipe must be carried out carefully in order to avoid injury to the oropharynx or oesophagus of the bird and potential mortality.

In some farms the ducks or geese are kept in near darkness for all of the time except the feeding period during the 2-3 weeks of force feeding.

3.3 Housing of ducks and geese during the force feeding period.

Three types of rearing systems are used for ducks and geese during the force feeding period (Table 1):

Table 1 Some characteristics of the 3 types of housing systems used for force feeding ducks and geese

	Frequency (%)		Group size		Surface (cm^2)	Surface per bird (cm^2)	
	Ducks	Geese	Ducks	Geese		Ducks	Geese
Individual cage	80		1		900-1050	900-1050	
Group cage	0.5	50	4-5	3	10000	2000-2500	3300
Pen	19.5	50	12-15	9	30000	2000-2500	3300

- Individual cages: These cages are made of wire mesh or plastic and are always of the flat-deck type. The size is 20 to 21 cm wide, 45 to 50 cm long and 27 to 33 cm high. The front and top of the cage are open to allow the duck to drink and to be force fed. Water is provided in a trough in front of the cage. The top and most of the time the front wall as well make the door of the cage **(Figure 1).**

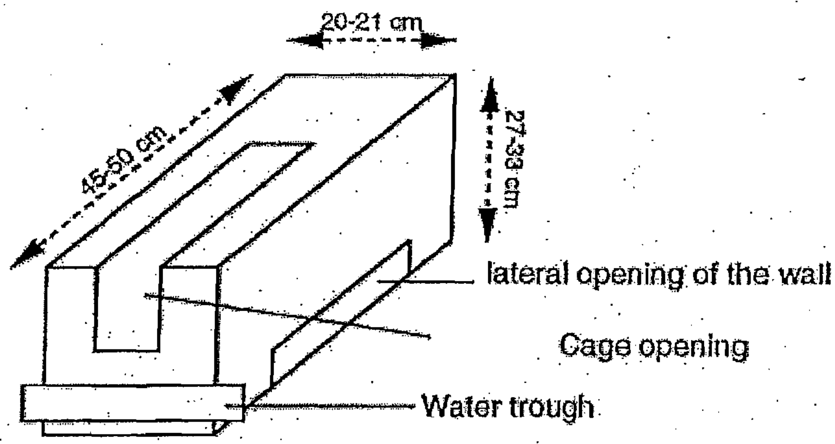


Figure 1. Schematic view of a cage

The basic type has a rectangular section but a lot of different shapes can be found **(Figure 2)** and in some of them the lateral walls are partly open to allow more space for the feet.

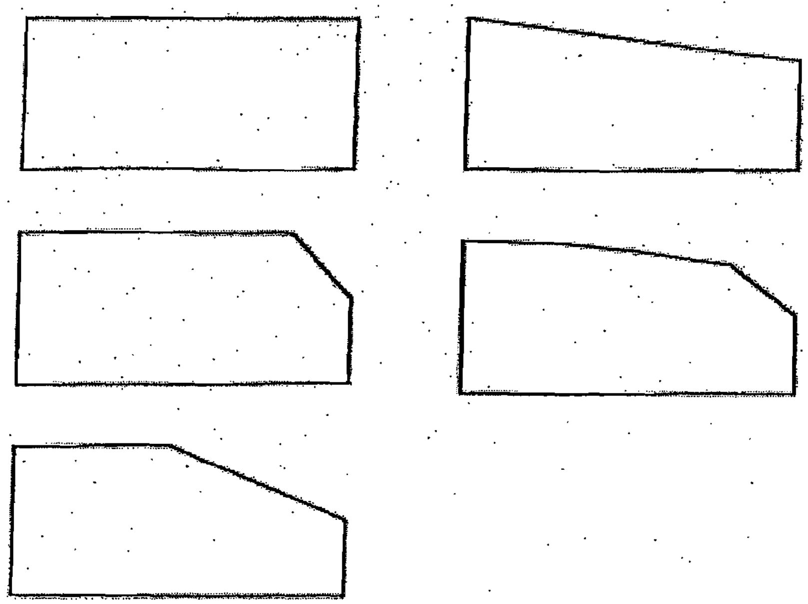


Figure 2: Longitudinal sections of various cages

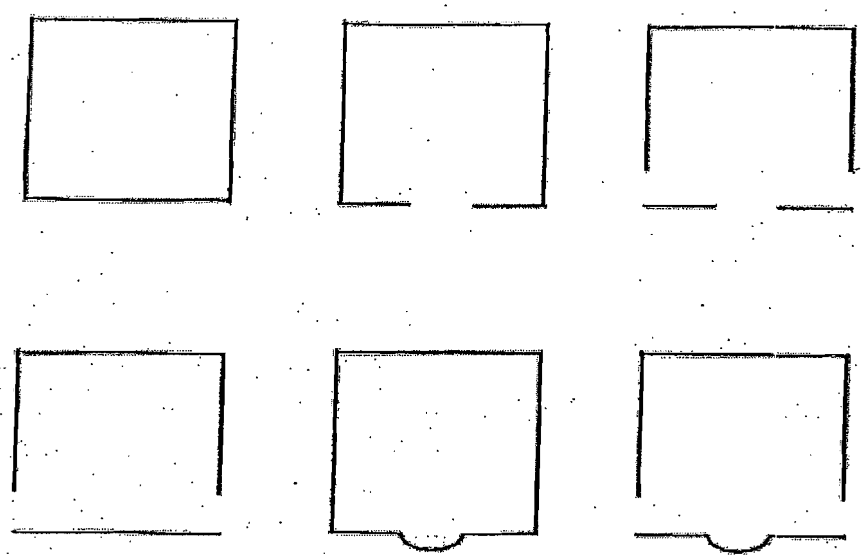


Figure 3 **Transverse sections of various cages**

The floor was originally flat but is now often either open or of a trough shape at the level of the breast in order to reduce breast blister incidence **(Figure 3)**.

- Group cages: They are made of wire and have a flat wire mesh floor. They are usually square and measure 1 x 1 m in surface. The wire mesh walls are about 80 cm high and the front of the cage is made of bars to allow access to the water trough placed in front of the cage. They have no roof and a system permits the restraint of one animal at a time during the force feeding act.

- Pens: Pens are usually 3 m² (1 x 3 m) and are made of wire mesh walls and slatted floor. Water is available from a trough placed in the pen.

4 NORMAL BEHAVIOUR AND OTHER FUNCTIONING OF GEESE AND DUCKS RELEVANT TO FORCE FEEDING

4.1 The natural behaviour of geese, muscovy ducks, domestic ducks and their hybrids

Traditionally, "foie gras" has been produced by domestic geese. Today, by far the most common type of bird used for the purpose of "gavage" is the male hybrid between the muscovy ducks and domestic ducks. In the following, an account is given for the natural behaviour and ecology of these animals.

The ancestor of most modern geese is the greylag goose *(Anser anser)* (Clutton-Brock, 1981). It was domesticated probably more than 7,000 years ago (Clutton-Brock, 1981). Nevertheless, the basic behaviour patterns of the greylag goose have not been altered substantially, just as in other domesticated species, as revealed by different behaviour studies (Lorenz, 1950; Lorenz, 1972; Kretchmer and Fox, 1975; Bellrose, 1980; Clutton-Brock, 1981). Greylag geese are widely spread over the northern hemisphere where they occupy living areas in close connection with water. Most of their time is spent in water, but they move and forage extensively on land (Lorenz, 1972; Bellrose, 1980). They forage both on land, by grazing, and in water, by eating aquatic plants; also insects, molluscs and other animals form part of the diet. Most of the daytime is spent in search for food (Lorenz, 1972; Bellrose, 1980). Geese form pairs which usually stay together throughout life (Lorenz, 1950; Lorenz, 1972; Bellrose, 1980). The nests are built on the ground, usually close to the water, and the eggs are incubated by the females alone, whereas both sexes share the parental care once the young have hatched (Lorenz, 1950; Lorenz, 1972; Bellrose, 1980). Many greylag geese migrate extensive distances from the northern breeding grounds to southern winter areas, which in Europe range from central to southern parts of the continent (Bellrose, 1980).

The muscovy duck *(Cairina moschata)* belongs to Cairini, hence it is quite distantly related to the origin of the domestic ducks, the mallard *(Anas platyrhynchos)*, which belongs to the Anatini, both subgroups within the family Anatidae (Leopold, 1959; Bellrose, 1980). The sexual dimorphism in size of the muscovy duck is considerable, the male being almost twice as big as the female which is not the case in mallards; however mallards have a pronounced plumage dimorphism which is not the case in muscovies. There are also some striking differences between the behaviour of the two species. The muscovy duck in the wild lives in Central and South America, where the climate is subtropical to tropical, and they are not migratory (Hoffman, 1992a). They are omnivorous and eat both animal- and plant-based nutrients, such as small fish, insects, molluscs, small reptiles, worms, algae and terrestrial plants (Brauer, 1991). Muscovy ducks are mostly active at dawn and dusk, when most of their time is used for foraging, whereas the middle of the days and the nights are usually spent on branches in trees close to water (Leopold, 1959). They have a promiscuous mating system and copulation takes place in water during the mating season which coincides with the rainy season (Breuer, 1991). Nest sites are selected by females alone, and the nests are mostly built in hollows in trees, but also sometimes on the ground. The clutches consist of 8-15 eggs which are only incubated by the female. The female is also solely responsible for caring for the young until they can fly (Leopold, 1959). Muscovy ducks were domesticated by native peoples in South America, but the date of the domestication is not known (Breuer, 1991). In the 16th century they were introduced to Europe and are today kept and farmed in large parts of the world. The behaviour of the domesticated breed is quite similar to that of the wild form (Breuer, 1991). Whereas most pure muscovy ducks are kept for meat production, the species is also important for production of fat liver, but in the form of hybrids with domestic ducks.

Domestic ducks originate from the mallard, the most abundant and widely spread duck in Northern Hemisphere (Bellrose, 1980; Clutton-Brock, 1981). Mallard may be largely sedentary in a small area or may range over some hundreds or even thousands of kilometres in search of feeding areas. Food choice is similar to that of muscovies (Bellrose, 1980). Unlike muscovies, mallards form pairs for a part of the year. However, the incubation and caring for the young is done completely by the female and the male usually leaves during the incubation period (Lebret, 1961). Nests are built on the ground and mallards are dependent on water and not inclined to go into trees (Bellrose, 1980). Domestic ducks have retained the behaviour of their ancestors, although thresholds for release of certain behaviour patterns such as aggression has been altered (Desforges and Wood-Gush, 1975 a and b, 1976.)

With respect to the social behaviour, both mallards and greylag geese live in pairs during the reproductive season, or on their own together with the offspring. However, before and during migration, large numbers of birds usually aggregate for foraging, resting and migrating (Bellrose, 1980; Breuer, 1991). Both species have a rich repertoire of social behaviour, comprising both visual displays and acoustic signals (Lorenz, 1972). Muscovy ducks spend a large part of their time in groups, both during daily activity and during night rest (Leopold, 1959). Hence, all three species may be considered as basically social animals to their nature.

The hybrid used for force feeding, obtained by crossing a male muscovy and a female domestic duck, or mulard, is sterile ~~and~~ shows a number of anatomical features from each species; for example, sexual dimorphism in size and coloration is almost absent, eggs hatch after an intermediate time of incubation (32 days in hybrids, 28 in domestic ducks and 35 in muscovies), the birds have claws like muscovies, but very rarely go into trees, like domestic ducks (Hoffman, 1992b). Hoffman (1992a) concludes that the general behaviour of the mulard appears to be most similar to that of muscovies, with the exception that they moved more slowly and spent more time in water, traits that are more similar to domestic ducks. Hoffman (1992b) also reported that mulards do not fly.

4.2 Occasions for Food Storage in Birds

Animals which migrate or hibernate are adapted to store food which can be made available later. For example the mean weight of the blackpoll warbler *Dendroica striata* increases from 10-12g to 20-23g before migration to the breeding grounds. In some birds this increase in weight is, in part, a consequence of fat accumulation in the liver but in other birds there is fat accumulation elsewhere in the body. Animals which feed irregularly in wild conditions are also often adapted to store food when a large meal is taken. It may be that such mechanisms are exploited when ducks and geese are given a large volume of food which results in a substantial expansion in the size of their liver. The greylag *Anser anser* is often migratory and may travel long distances during migration. Some wild mallard *Anas platyrhynchos* are sedentary but others migrate in some circumstances. However, the muscovy duck *Cairina moschata* is a tropical species which is not migratory. Hence whilst the domestic goose might well be adapted to store food before migration, it is less likely that a cross between the domestic duck and the Muscovy duck, the Mulard, has such a potential for food. These hybrids do accumulate fat in the liver when caused to have a high food intake but the biological origins of this are unclear.

4.3 The needs of geese and ducks in relation to feeding and possible consequences of force feeding.

Animals have some needs which can only be fulfilled if they are allowed to perform a particular behaviour (Hughes, 1980; Broom, 1988a; Jensen and Toates, 1993). There is no specific research into such needs in ducks but based on the general behaviour and ecology of the species, some probable needs may be outlined. It is clear from the general behaviour that muscovies, mallards, their domesticated breeds and the hybrids between these, all share some ethological traits with each other and with geese. They are omnivorous birds which are dependent on water for a number of purposes. In relation to force feeding the feeding behaviour is of particular interest. It is well known from other species, birds as well as mammals, that omnivorous animals are adapted to use most of their active time in exploring possible food sources and perform actual foraging (food search, food manipulation and ingestion), and this appears to be true also for wild muscovies and mallards. In addition, the birds can not digest cellulose and therefore obtain only a fraction of the nutrients from ingested plants, which under natural conditions forces them to forage for extended periods of times (Bellrose, 1980; Breuer, 1991). Other omnivorous species such as rats, pigs and hens possess highly inquisitive behaviour as an adaptation for exploring new food sources (Barnett and Cowan, 1976; Ljungberg, 1986; Holson et al., 1988; Inglis and Sheperd, 1994; Freire et al., 1996). In these other species, where scientific documentation is more widely accessible, it seems to be a general rule that thwarted feeding activities cause different behavioural problems commonly associated with poor welfare. Hence, barren environments and inability to perform species-specific feeding behaviour often cause behavioural disturbances which express themselves as mouth-based abnormal behaviour, such as bar-biting and tail-biting in pigs and feather pecking and cannibalism in laying hens (Colyer, 1970; Jericho and Church, 1972; Blokhuis and Arkes, 1984; Appleby and Lawrence, 1987; Fraser, 1987; Lawrence and Terlouw, 1993; Savory and Maros, 1993; Day et al., 1996). Abnormal pecking in birds is often interpreted as a sign of a thwarted motivation for performing normal feeding behaviour.

Feather-pecking, which sometimes develops into cannibalism, is also a frequent problem when housing and breeding muscovy ducks fed ad libitum (Breuer, 1991). It appears to be less of a serious problem in hybrids bred for "foie gras", and there is no scientific documentation of its occurrence in these animals. However, the working group observed during farm visits in France that in one farm, with group housing of ducks, the force fed animals were fitted with rings through the beaks. According to the staff on the farm, the reason for this was to prevent feather-pecking which can occur before the force feeding period. There are no data available to allow any judgement of the incidence of the problem.

Ducks are fed considerably more during the force feeding period than they would eat voluntarily, and they receive this food without having the possibility to forage in a species-specific manner. In other species, mainly rats and dogs, the motivation for foraging behaviour has sometimes been studied by using an experimental protocol involving tube feeding or fistula feeding. This allows the effect of stomach loading to be separated from the effects of the execution of foraging activities in reducing motivation for foraging. In the species studied, stomach-loading of normal meal sizes generally causes only a relatively small reduction in the need to express normal feeding behaviour (Toates and Jensen, 1991; Jensen and Toates, 1993). It cannot be excluded that the motivational processes work in the same manner in ducks. However, it should be remembered that the considerably larger-than-normal rations loaded into the stomach of force fed ducks may have different effects on the foraging motivation.

The possibility that there is a remaining motivation to perform normal foraging activities (such as, for example, seeking food, biting, nibbling, swallowing) in force fed ducks should be considered. If such a remaining motivation is present, this need is not met during the gavage period. This problem would most likely be greatest when the birds are kept in cages where they have limited freedom to execute the movements involved in normal feeding.

4.4 Feeding behaviour and activity of ducks and geese

Geese but also to a lesser extent ducks are good foragers and can make use of poor quality foods like grass (Metabolisable Energy between 1000 and 1200 kCal/kg dry matter). They are however, like other domestic birds, unable to digest cellulose (Plouzeau and Blum, 1980), but the quantity which they can ingest can be very high. Geese can eat 150 to 300 g of protein rich complete food plus 700 to 800 g of fresh grass (Larbier and Leclercq, 1992; Pakulska et al., 1995; Schneider, 1995). When fed with grass, geese decrease the proportion of complete diet and increase the proportion of grains which are protein poor (Snyder et al., 1955). When fed with carrots, a preferred food, geese decrease their consumption of complete food (100g) but they can eat up to 2.4 kg of carrots per day.

In ducks the usual feeding regime of animals that will be force fed is the following (figure 4):

Period 1) *Ad libitum* feeding up to 5 weeks of age.

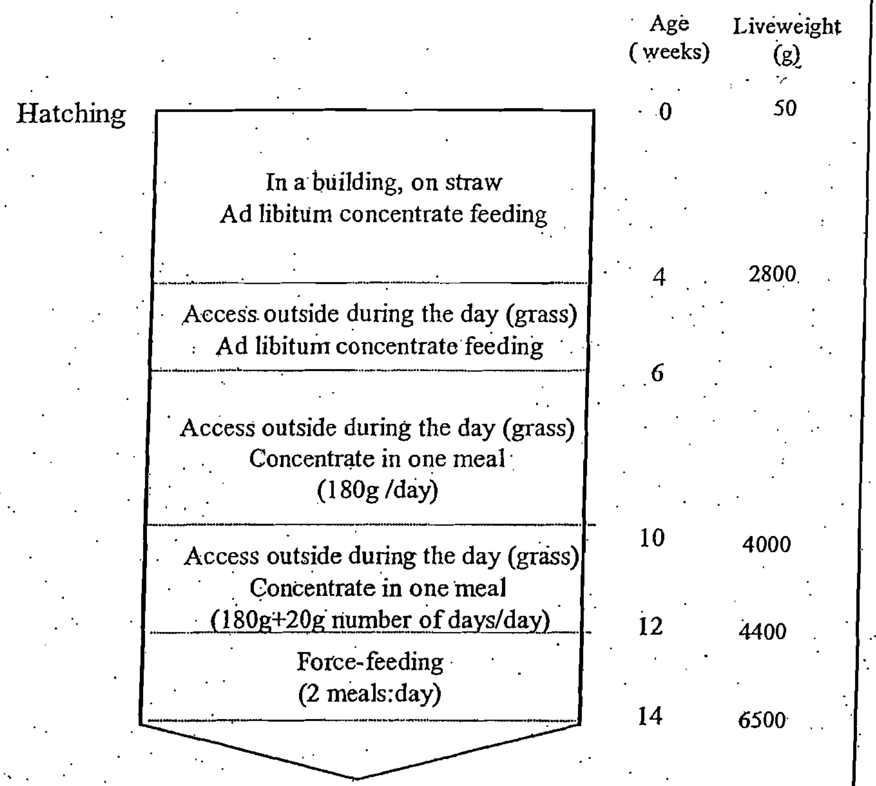
Period 2) Restricted feeding from week 6 to week 11 (180 g per day)

Period 3) Ten days of pre-force feeding with a 20 g daily increase of the amount of food distributed (up to 380 g per day).

During period 2 and 3, the food is distributed once a day which means that the food is available for only a short period of time (less than 15 min) and the animals only have one meal.

Period 4) During the force feeding period they receive 2 meals per day, starting at 190 g per meal on the first force feeding to reach about 450 g per meal on the last meal 14 days later.

Figure 4
Example of the usual management of force-fed ducks.



In order to evaluate the ingestive capacity of not force fed ducks, the animals were submitted to 3 feeding regimes during an experimental period following periods 1 and 2 as described above (Guy, Guémené, Faure, 1996, unpublished data) In every case the values given are the maximum amount of food consumed on one day.

Treatment a: ten more days with 180 g per day restriction and then two 300 g meals. The 600 g of food distributed were consumed on the first day.
Treatment b: Period 3 treatment (1 meal, 20 g daily increase) was continued until food consumption started to decrease. The maximum food consumption reached 440 g.

Treatment c: Periods 1, 2 and 3 were as described above except that during period 3, 2 meals were distributed. The animals were then fed *al libitum.* The amount of food consumed was then 603 g per day.

These results show that in ducks too, the gut capacity is sufficient for the largest amounts fed during the force feeding period of foie gras production.
Geese (Marcilloux and Auffray, 1981) and ducks (Reiter and Bessei, 1995) are about as active at night as they are during the day in confined conditions. When concentrate food is available *ad libitum,* 6 week old Mulard ducks spend less than 1% of time actually eating but a further 8% of time sieving in the litter which is a type of feeding behaviour (Reiter and Bessei, 1995).

Mulard ducks will bathe in water if given the opportunity (Matull and Reiter, 1995). In a study of muscovy ducks by Nicol (in prep), birds provided with nipple drinkers in the home pen lifted the heaviest weight in order to gain access to an adjacent pen with bathing water at least as frequently as they would lift such a weight in order to gain access to a pen containing food. Hence, muscovy ducks are highly motivated to have access to bathing water and welfare is likely to be poorer whenever such access is not available.

The time budget of force fed ducks shows that they spend more and more time resting during the first week of the force feeding period (no data are available for the second week). During the same period the times spent drinking and preening decrease. Winnicki et al., (1995 a,b) force fed geese for two weeks and then stopped force feeding. Geese had then free access to grass. They had free access to pellets during the whole experiment. The time spent resting and standing was about constant between day 5 and 15 of the force feeding period. After the end of the force feeding the time spent resting decreased whereas the time spent standing stayed relatively constant but an increasing proportion of time was devoted to feeding on grass. During this period the birds reduced their pellet intake to nearly zero for 18 days but still continued to eat grass. After the end of the force feeding period there was also an increase in the number of preening bouts and a decrease in the number of drinking bouts. Despite the fact that the results were obtained on two species and in different conditions a general picture can be drawn. During the force feeding period the time spent resting increases and the time spent standing and preening decreases. After the end of the force feeding period, the time spent resting decreases whereas the time spent standing and preening increases. During this recovery period the time spent active is relatively constant but the duration of feeding increases and compensates for the decrease in resting time.

5 CONSEQUENCES OF FORCE FEEDING: WELFARE INDICATORS

5.1 Force feeding and behavioural indicators

Daily hand-feeding of ducks and geese is normally associated with a positive response by the animals towards the person feeding them. In the preparation of this report, members of the Committee visited a number of farms practising force feeding but this behaviour was not observed by the visitors on these occasions. When ducks or geese were in a pen during the force feeding procedure, they kept away from the person who would force feed them even though that person normally supplied them with food. At the end of the force feeding procedure, the birds were less well able to move and were usually panting but they still moved away from or tried to move away from the person who had force fed them. In a pilot experiment carried out on ducks kept individually in cages, the birds displayed less avoidance behaviour to the force feeder's visit than to the visit of a neutral person coming along the cages one hour after the force feeding (Faure, personal communication). This suggests that the stranger is more aversive than the force feeder at this time but gives no information about the force feeding process itself.

Aversion behaviour to force feeding was studied experimentally by Destombes, Guy, Guémené and Faure 1996 (unpublished data). The time budget and readiness to go out of the living pen and into the feeding pen was compared in ducks for the 15 days before the start of the force feeding and for the 10 days following the force feeding. Half of the ducks (4 pens of 10 animals) were kept as control and had two *ad libitum* meals per day whereas the force fed animals received two meals with the same amount of food as the control. The control animals, which were fed ad libitum in the feeding pen, learned to leave the living pen and go to the feeding pen and went to this pen on the majority of occasions even when they were not driven. The animals which were force fed, however, did not leave the living pen and go to the feeding pen. When the force fed ducks were driven out of the living pen into the passage way, some then entered the feeding pen but some remained in the passageway. Since the feeding pen was attractive to the birds which were not force fed, the results indicate that the force feeding pen was not attractive to the force fed ducks and that the procedure might involve an aversive component.

The avoidance behaviour by most ducks and geese in pens during force feeding observed by members of the working group indicates aversion to the force feeding procedure. Ducks in cages had little opportunity to show avoidance but sometimes moved their heads away from the person who was about to force feed them.

The behavioural time budget in the living pen of the animals which were fed *ad libitum* or force fed a matched quantity of food showed high variation from day to day but no clear difference between the two treatments or with time. In the absence of opportunity for the force fed ducks to show normal feeding behaviour, it might have been expected that the birds would show more foraging activity in the living pen but this was not observed. These results do not allow any conclusions concerning the strength of motivation for foraging behaviour in force fed birds.

When the goose or duck is force fed, there is an increase in carcass weight and a substantial increase in the relative size of the liver (Villate, 1978; Georgiev et al., 1980; Bénard et al., 1991; Bénard, 1992; Jouglar et al., 1992). There appears to be no published evidence on the effects on gross body anatomy of force feeding. However, some experts of the working group observed on visits to fattening units that the legs of the force fed animals were pushed outwards, away from the mid-line of the body so that they met the ground considerably further apart than is normal and so that the leg could not be held vertically when the bird was standing or walking and they conclude that it was caused by the great expansion of the liver. They observed that the consequence of this was that birds with expanded livers had difficulty in standing and their natural gait and ability to walk were severely impaired. They assume that there must be increased lateral force on the leg joints when birds with hypertrophied livers are standing or walking but this has not been studied.

Some birds become unable to stand but there is no evidence available concerning the frequency of inability to stand, or of joint damage, or of the extent of difficulty in walking. Birds which are force fed seem to spend most of their time sitting rather than standing. The widespread use of small cages in which the birds usually cannot stand in a normal standing position makes it difficult to recognise leg problems and leg pain.

Hypertrophied livers can cause discomfort in a variety of other species. Hence it may be that some discomfort results directly from the hypertrophied liver in force fed ducks and geese. It appears that this has not been investigated.

When birds are kept in small cages they are unable to exercise, preen, explore or interact socially in a normal way. It is reasonable to conclude that when birds are kept in near darkness they are likely to show impaired exploratory behaviour and hence would not be likely to exercise properly.

5.2 Force feeding, management and pain

Birds, including ducks and geese, have a wide range of pain receptors and an elaborate pain recognition system. Most injuries caused by tissue damage during handling or tube insertion would result in pain. The oropharyngeal area is particularly sensitive and is physiologically adapted to perform a gag reflex in order to prevent fluids entering the trachea. Force feeding will have to overcome this reflex and hence the birds may initially find this distressing and injury may result.
The beak of a duck is richly innervated and the insertion of a ring through the beak would cause pain during the operation and might cause neuroma formation, and hence prolonged pain, thereafter. Similarly, most injuries to the feet caused by inadequate flooring would be painful.

Other than the data on behaviour mentioned in 5.1 above, no studies of pain during the force feeding procedure appear to have been carried out.

5.3 Force feeding and physiological indicators

Although several studies have been devoted to the technical, nutritional, histological and biochemical consequences of force feeding, very little information is available about physiological indicators of duck and goose welfare. A set of experiments has recently been carried out on the male hybrid duck (Mulard) as part of a programme instigated by INRA (Faure et al., 1996)

The hypotheses tested were that force feeding could produce acute or gradually accumulating stress. Acute effects could be induced by different aspects of the process itself, e.g. the handling, the introduction of the force feeding tube, the forced introduction of the food or the excessive food quantity. Gradually accumulating effects could be due to the fact that the procedure was repeated twice a day for 14 days or to the increasing weight of the animals.

To test these hypotheses four treatments were compared on four groups of 30 ducks: control (ad libitum fed animals); extensive force feeding (i.e. introduction of the quantity of food consumed by controls); intensive (i.e. normal) force feeding and prevention of feeding.
If the procedure was inducing acute stress, it could be that an increase in the corticosterone level would be observed shortly (15 min, i.e. the time required to have a maximum corticosterone secretion after ACTH injection) after the force feeding procedure.

Two types of reactions which could result from long-term problems are an increase in the heterophil/lymphocyte ratio and a variation in adrenal gland reactivity. According to species and conditions two types of changes have been described in the bibliography: a decrease of the adrenal capability to secrete corticosterone (exhaustion) and this hypothesis was tested by injecting doses of ACTH that give a maximum corticosterone secretion; or an increase in adrenal reactivity to ACTH stimulation and this was tested with injections of ACTH that were shown to induce about half of the maximum corticosterone secretion.

Blood corticosterone content was measured during the usual procedures associated with force feeding: catching the birds, putting them in pens, miscellaneous handling operations, insertion of the tube, food pumping procedures and the consequences of filling up the oesophagus (Guémené et al., 1996). Adrenal reactivity tests consisting of evaluating the capacity of the adrenal cortex to respond to induction with ACTH by secreting corticosterone were applied to assess the long-term effects of repeated stress. As complementary tests, creatine-kinase activities were measured together with leucocyte counts to determine the heterophil/lymphocyte ratios.

When the effect of manipulating the birds prior to force feeding was studied, no significant physiological response was obtained except for a reduction in creatine kinase activity. Although the regular nature of the manipulations led to a reduction in live weight, performance based on liver weight was comparable so that it was impossible to conclude that there was habituation to the handling processes.

The short-term physiological effects of the force feeding operation were studied to differentiate between the effect of tube insertion, and filling the oesophagus in birds of excess or normal weight, in relation to control birds. None of the situations considered in the study had any significant effect on short-term changes in blood corticosterone content, apart from the results observed on day 7 (14th force feeding operation), in which a significant increase in this parameter was measured in the group of over-weight force fed birds. Despite this isolated result, the adrenal reactivity data obtained from tests carried out at the end of the force feeding period did not show any difference and no statistically significant modification of any of the other measures was obtained between the prior fattening period and the force feeding period. This measure, therefore gives no evidence that intensive force feeding is stressful to the male hybrid duck.

Finally the effect of the force feeding technique on behaviour was investigated by comparing pneumatic equipment with traditional mechanical methods of force feeding on birds. No difference between the two methods of force feeding could be demonstrated.

None of the measures used by Faure and his colleagues (1995-1998) indicate welfare problems. This conclusion could be due to the fact that the adrenal responses were of a small magnitude and that the sample sizes used were not large enough to reach statistical significance but in most of the cases not even tendencies were observed. Adrenal responses are sometimes masked during feeding so that all individuals which are feeding show increases or other effects are suppressed. Destombes et al. (1997) showed that restraint of ducks in a net immediately after force feeding induced a large increase in corticosterone levels so it is clear that adrenal activity was far from the maximal level. However, because only the measurement of the pituitary adrenal activity has been taken into account, no definite conclusions can be drawn concerning the physiological activity of birds in response to force feeding.

5.4 Force feeding and pathology

General questions about pathology are considered in Section 1.2.1

The questions that are addressed in this section are:

1. Is fat liver a deviation from normality?
2. Is the condition reversible?
3. Is reversibility a factor that renders the condition non pathological?

5.4.1 Introduction

Whilst studies of the anatomy of ducks and geese kept for foie gras production have been carried out, the amount of evidence in the scientific literature concerning the effects of force feeding and liver hypertrophy on injury level, on the functioning of the various biological systems is small. In most animal production systems, such information is available so its scarcity in relation to foie gras production is regrettable.

The available evidence which could indicate pathological effects in foie gras production are considered in three parts. Those concerning biochemical and histological measurements are presented in this section, those concerning more general aspects of health are in section 4 and those concerning mortality are in section 5.

5.4.2 Liver structure and its biochemistry

Studies of the histological changes occurring in the liver have been described in various publications (Baldissera Nordio et al., 1976; Bénard et al., 1991; Bénard, 1992; Labie and Tournut, 1970). Cellular hypertrophy has been demonstrated in both the duck and goose. Thus the mean hepatocyte diameter in the duck increases from 7-8 μm for a non fattened liver to 24-28 μm in a liver after 12 days of force feeding period. This cellular hypertrophy is the result of an excess of hepatocytes of microvacuolar type (Bénard, 1992).

Force feeding brings about considerable modifications in the chemical composition of the liver, increasing the percentage fat content, the protein content, and reducing the water content (Baldissera Nordio et al., 1976; Bénard et al., 1991; Blum and Leclercq, 1973; Blum et al., 1968; Bogin et al.,1984; Georgiev et al., 1980; Durand et al., 1968, Luret, 1987; Nir et al., 1972). An example of the differences between the two types of liver is given in Table 2.

Table 2: Mean weight and composition of the liver from force fed and not-force fed geese (Babile et al., 1998)

	Force fed	Not force fed
Liver weight (g)	982	76
Water content (%)	34.3	70.4
Protein content (%)	7.6	20.7
Lipid content (%)	55.8	6.6

- 5.4.3 Liver function

Hepatic function of force fed animals has been studied in particular to determine whether liver function is irreversibly impaired. During force feeding, blood flow through the liver decreases and this may affect hepatic function in various ways.

Firstly, hepatic function was evaluated using two markers, i.e. sulphobromophthalein and indocyanine green, with high extraction coefficients (Bengone-Ndong, 1996). When these markers were administered by intravenous route to ducks subject to force feeding, a progressive change in the pharmacokinetic parameters of these two markers was observed i.e. increase in the half life of elimination, area under the curve, mean residence time, etc. This shows that the hepatic steatosis induced in ducks during force feeding results in impaired hepatocellular function (Bengone-Ndong., 1996).

The consequences of force feeding were also assessed in ducks that had received chloramphenicol by oral route. When the antibiotic was administered as the carbon 14 labelled molecule, the plasma kinetics of the radioactivity showed that the blood concentrations were much lower in ducks at the end of force feeding than in normally fed birds. Similarly the residual concentrations of radioactivity, as demonstrated by quantitative whole-body autoradiography, were much lower in force fed birds (Bengone-Ndong, 1996). When chloramphenicol was administered in an unlabelled form, assay tests on the unchanged product revealed that absorption of the antibiotic was delayed in time and that the plasma concentrations were lower in force fed birds. The peak concentration occurred 2 hours after administration in birds in the final stages of force feeding compared with a peak of 20 minutes in normally fed birds (Mesplède, 1996). This result is clearly not because of lack of fat to absorb the antibiotic so it is likely to be a consequence of impaired hepatic function, for example reduced biliary secretion.

In a second phase of experiments, comparable studies were undertaken to monitor the fate of birds which, on reaching the terminal stage of force feeding, were then returned to basic zootechnical conditions with free access to food and drinking water. It was shown that under such conditions the birds recovered similar body weights to those of their congeners which had not been force fed. Similarly, plasma biochemistry studies showed a return to reference values, obtained from birds that had not been force fed, in various parameters (cholesterol, triglycerides, proteins and different enzymes). The return to normal took approximately four weeks (Prehn, 1996. Plasma biochemistry studies were corroborated by a study of hepatic histology which showed that the observed liver steatosis regressed when force feeding was stopped so that, 4 weeks later, the hepatic cells no longer showed any sign of excess lipids. Finally the study of hepatic function in birds subjected to a force feeding protocol showed that the pharmacokinetic parameters following intravenous injection of sulphobromophthalein and indocyanine green, were identical to those of birds that had not been force fed, within 28 days.

These various studies were mostly conducted in ducks but some were also carried out in geese. The biochemical and histological measures, show that force feeding induced hepatic steatosis in the duck or goose which was totally reversible, as demonstrated from a morphometric, biochemical, histological and functional viewpoint, within four weeks (Babile et al., 1996).

The reversibility of the consequences of force feeding was carried out in an other experiment (Prehn, 1996). The aim of this study was to investigate the morphological and functional changes of the liver of force fed ducks after three periods of two weeks of force feeding and four weeks of recovery. Using the same tests as previously described, it was demonstrated that, in these conditions, liver steatosis in force fed ducks was reversible (Prehn 1996).

These various data show that the liver steatosis obtained by force feeding induced an impairment of hepatic function, as demonstrated from morphometric, biochemical, histological and pharmacological points of view, but that this was completely reversible in the studies carried out. The reversibility of steatosis which is reported above for many birds which have been force fed does not mean that the changes in the liver are not pathological. Another indication of how pathological the liver changes are is to consider whether the birds would die if the steatosis which exists at the end of the force feeding period were to continue. All producers are careful to keep good technical results and not to continue the force feeding some extra days because if they do, very high mortality can occur. The livers of these birds would show slightly further advanced steatosis before they died. The experimental study in which the level of steatosis which exists at the end of force feeding is maintained for some days has not been carried out. However, if force feeding is continued after three to four days (Bogin et al., 1984), the level of cell damage rises significantly. This is consistent with reports from farmers that indicate that mortality increases if feeding continues for longer than usual. Hence it appears that the level of steatosis normally found at the end of force feeding would not be sustainable for many of the birds. For this reason, and because normal liver function is seriously impaired in birds with the hypertrophied liver which occurs at the end of force feeding this level of steatosis should be considered pathological.

A further source of information concerning whether the liver is in a pathological condition at the end of gavage is to ask qualified pathologists for their opinion on the histology of such liver. In non-statistical surveys (Beck; 1994, 1996 unpublished) the opinions of 25 pathologists from various countries were sought on this point. Most of these considered that the liver condition was pathological. Several of them pointed out that some degree of steatosis can occur in healthy animals at certain times of life but they considered that the degree of steatosis at the end of force feeding was much more severe than any naturally occurring steatosis.

- 5.4.4 Hepatic steatosis of the force fed ducks and geese

Hepatic steatosis of the force fed duck or goose results from the accumulation of lipids in hepatic parenchymal cells (hepatocytes). Among these lipids, storage cytoplasmic lipids, and especially triglycerides, predominate. Fatty liver occurs when the hepatic production of triglycerides is not matched by their secretion as VLDL (very low density lipoproteins) or their degradation by beta-oxidation. This imbalance may result from a number of toxic, nutritional or hormonal causes. The origin of hepatic steatosis in the waterfowl is nutritional. Indeed, during force feeding, over production of triglycerides is facilitated because :

- *de novo* lipogenesis is mainly hepatic in avian species (Leveille et al., 1975; Saadoun and Leclercq, 1987),
- lipogenesis is enhanced by dietary carbohydrates, which are the main component of the maize used for force feeding (Goodridge, 1987; Saadoun and Leclercq, 1987).

The product of hepatic lipogenesis is essentially triglycerides. In the case of overproduction, not all triglycerides can enter the secretion pathway and a large proportion remains stored in the liver (Hermier et al., 1991). In avian fatty liver, total lipids may account for up to 50 % of the liver weight in the goose (Fournier et al., 1997) and 60 % in the duck (Salichon et al., 1994; Gabarrou et al., 1996). Storage lipids predominate, with 95 % triglycerides and 1-2 % cholesteryl esters. Structural membrane lipids, such as phospholipids and free cholesterol, account for only 1-2 and <1 %, respectively (Fournier et al., 1997; Gabarrou et al., 1996).

Under natural conditions, some degree of hepatic steatosis occurs in the wild waterfowl, as a consequence of energy storage before the migration. In poultry production, this specific capacity is utilised for the production of commercial fat liver. Newly synthesised triglycerides are channelled towards secretion into plasma as VLDL, or beta-oxidation. When overproduction of triglycerides occurs, which is the case during force feeding, the liver responds in two ways :

- the secretion of VLDL is increased, as indicated by the very high concentration of plasma VLDL in the force fed goose compared with controls. After 14 days of force feeding, plasma VLDL concentration is 3.31 (0.29 g/l in controls), hence it appears that the secretion pathway is still very active and functional (Fournier et al., 1997). Indeed, force fed geese also exhibit a dramatic extra-hepatic fattening, which indicates that accumulation of plasma VLDL results from an increase in their secretion rather than from a defective catabolism in adipose tissues.

- the excess of triglycerides is normally stored in cytoplasmic storage vesicles. To enter the secretion pathway, these storage triglycerides need to be partially hydrolysed and reesterified, under hormonal influences found in the fasted state (Mooney and Lane, 1981). Since force feeding does not allow the birds to be fasted, the liver continues to accumulate triglycerides, until the last day, which indicates that the storage and secretion functions can still continue in these birds.

All these data indicate that susceptibility to hepatic steatosis is a natural response of waterfowl which is over expressed in response to force feeding. In most cases, lipid metabolism of the liver appears to function normally.

As described above, hepatic steatosis in the waterfowl is a normal metabolic response to the increased intake of diet carbohydrates and, in most cases, lipid metabolism of the liver appears to function. There seems to be a low prevalence of liver lesions (0.5%) when the animals are force fed (Bénard, 1992). If individual birds are given too much food or are fed for too long, their individual metabolic capacity will be overloaded and dysfunctioning will occur. An inflammatory process results in fibrosis, occlusion of the blood vessels, local liver haemorrhages, and jaundice. However, it is strongly in the interest of the farmer to avoid this phenomenon, because the animals suffer from the resulting diseases and because the resulting fat liver is of no commercial value. In some cases, hepatic steatosis is associated with cell damage, which results in an increase in the plasma concentration of hepatic enzymes (Bogin et al., 1984). However, these changes are not detected in geese before the 18th days of force feeding, whereas the maximal duration of force feeding in Europe is 15 days (Bogin et al., 1984).

5.4.5 Plasma biochemistry and other measures of function

This approach has been adopted in various investigations and has shown that force feeding produces modifications in a large number of biochemical parameters i.e. triglycerides, cholesterol, phospholipids, fatty acids, and lipoproteins, etc....(Auvergne et al., 1988; Bénard, 1992; Blum et al., 1970; Blum and Leclercq, 1973; Blum et al., 1968; Bogin et al., 1984; Bokori and Karsai, 1969; Braun et al., 1985; Csuska et al., 1977; Darraspen et al., 1949; Famose, 1990; Goranov, 1979; Hudsky et al., 1974; Ivorec-Szylit and Szylit, 1969; Jouglar et al., 1992; Labie and Tournut, 1970; De la Farge et al., 1989; Leclercq and Blum, 1975; Losonczy et al., 1970; Luret, 1987; Nir, 1972; Nir et al., 1971; Nir et al. 1972; Nitsan et al., 1973; Rico et al., 1983; Sevcikova et al., 1981; Szylit and Ivorec-Szylit, 1967; Szylit et al., 1968; Timet et al., 1976; Tournut et al., 1967; Trefny et al., 1979; 1980; Villate, 1978; Woszczyk et al., 1977; Yamani et al., 1973).

Hormone assays were performed on samples taken 4 days before force feeding began, on the first day of force feeding, and then on days 3, 7, 14 and 17. Thyroxine, corticosterone, testosterone, œstradiol and progesterone were assayed. The measured values of these sex hormones did not exceed those of the thresholds of detection, but the birds were not sexually mature. No statistically significant variation was recorded for thyroxine or corticosterone (Famose, 1990).

It would be of interest to have the results of studies of the effects of force feeding on other functions such as nitrogen excretion or water regulation but these do not appear to be available. The abnormal diet that the force fed birds are kept on may have other effects on the birds' homeostasis. For example, if the calcium and phosphate ratios, or uptake, or metabolism is affected in any way then the birds may become subject to some osteopathy making their bones more fragile or even more painful. This would be consistent with birds spending more time sitting than the non-force fed cohorts and with the high incidence of bone fractures seen at the abattoir. No studies appear to have been carried out looking at calcium and phosphate metabolism and associated hormonal imbalances.

- 5.4.6 General health indicators

It is generally observed that during force feeding, animals which are kept in groups are excited and nervous in the first two days. Then after the fifth day, they look quiet and they move their wings more frequently. They move when other birds move so they are generally responsive to one another.

From a clinical point of view, there can be some signs of digestive troubles. When the working group visited some units there was widespread evidence that faeces were more fluid than usual. At the beginning of the force feeding period, the feathers are bright and smooth. After some days, there can appear on some animals a change in which neck feathers become curved and sticky. This is called "wet neck" by farmers (cou mouillé).

Some signs of inflammation of the feet can be detected on some animals at the end of the force feeding period when they are maintained on wooden slats or on wire mesh.

In an epidemiological survey carried out in slaughter-houses, the prevalence of lesions which are observed on carcasses and livers was investigated. 20,000 carcasses have been systematically studied. Pathological lesions of the liver which would lead to the liver being unusable (perihepatitis, fibrosis, local necrosis) are very rare and the prevalence is below 0.5%. They have been reviewed in several papers (e.g. Bénard, 1992).

Different lesions can be observed on carcasses. The most frequent are bone fractures. They occur on wing bones, mainly the humerus. There is an important difference between muscovy ducks and mulard ducks. With muscovy ducks, Bénard et al (1992) observed less than 5% of bone fractures whereas with mulard ducks, the prevalence was between 30 and 70%. These fractures are produced during handling of animals at the slaughter-house. It seems that variations in the incidence of fractures can be correlated with staff care and climatic conditions. In this last case, it seems that under certain meteorological conditions, animals are more nervous and in this case, the incidence of fractures increases.

Another frequent lesion is localised on the sternum, where a necrosis of the skin can be observed. This is observed on animals maintained in cages but it is unusual on animals kept on the floor. The prevalence is again more important in Mulard ducks (40-70%) whereas it is under 6% in muscovy ducks. This difference between muscovy and Mulard can be related to the development of the pectoralis profundus major and minor muscles which are larger in muscovy ducks.

The working group was informed that ducks at the end of the force feeding period can have serious injuries to the oesophagus or, more usually, having clear evidence of tissue damage in the oesophagus. It seems likely that birds have sufficient damage to oesophagus tissue, caused by the force feeding process to have been painful to the birds. However, Levinger and Kedem (1972) observed no alteration of the tissue of the oesophagus of force fed geese. The prevalence of oesophageal lesions is not known at present although the industry has been asked for this information. In a study reported by Bénard (pers comm) signs of candidosis were observable in up to 6% of animals in each batch of birds.

The dilation of the lower part of the oesophagus which occurs in ducks which are force fed has not been reported in non force fed ducks. It is not known whether this change is painful.

- 5.4.7 Force feeding and mortality rates

Mortality rates during the two week force feeding period were estimated from surveys in France, Belgium and Spain.

In France a survey was carried out from 1987 to 1994 on mortality rates in force fed ducks and geese. The mean mortality of 5,661,000 ducks was 3.4% and varied from 2.5% to 4.2% between years. The mean mortality of 315,000 geese was 4.2% and varied from 3.5% to 5.3% between years (Koehl and Chinzi, 1996). A recently published study (Chinzi and Koel, 1998) gives the results of a survey conducted in 1996 on 380 farms during the whole year (about 10 batches per year and 200 ducks per batch). The survey concerns ducks housed in individual cages during the force feeding period. The main aim was to detect the effects of some variable factors (type of shed, presence of air conditioning and type of feeding device) (Table 3). The mean "loss" observed was as high as 3.6% when the animals were fed with a mechanical device but was limited to 1.7% when they were fed with pneumatic or hydraulic devices. No indication of the variations between farms and batches is given for each system in the text. The main conclusion is that the lowest mean loss rate is obtained in the most modern systems (specific building, air-conditioning, hydraulic device). In that text the effects of the 3 factors are presented independently but it can be expected that when the 3 factors are optimal, mortality rate would be lower than 1.7%.

The mortality rate of 77,519 ducks on 16 production units in Belgium was obtained by veterinary inspectors (Nicks, personal communication). The overall mortality observed was 2.75%, varying from 0 to 15% between farm and batches. It varied a lot according to the seasons, and was higher during the summer period.

In Spain, mortality was observed during 7 years in a farm feeding from 34,000 to 55,000 ducks per year. According to the year the rate of mortality varied between 0.9 and 1.1%. It was higher during the summer season (I. Estevez, personal communication).

These figures compare most unfavourably with mortality rates for ducks and geese during normal rearing. No data on the mortality rate of non force fed mulards were found. However mortality rates of muscovy ducks raised in fattening units exist (Sauveur and de Carville, 1990). The total mortality of 367,000 ducks observed during the 12 weeks before slaughtering was 3.60%. There were two peaks of mortality, the week after hatching and the fourth week. From the fourth week to the twelfth week the mortality decreased from 0.5% to less than 0.1% per week. Therefore for the two weeks before slaughter, the mortality rate would be 0.2% compared with 2 to 4% in the force fed mulard birds of about the same age.

Table 3: Effects of different types of housings and force feeding systems on the losses of mulards during the force feeding period. (Chinzi D., Koehl P.F., 1998)

BUILDING	Transformed	3.1	a
	Specific	2.0	b
AIR COOLING	No	3.2	a
	Yes	2.0	b
FORCE FEEDING SYSTEM	Mechanical	3.6	a
	Mechanic dose	2.4	b
	Pneumatic/hydraulic	1.7	c

Transformed: Building originally for a purpose other than force feeding;

Specific: Building purpose built for force fed ducks;

Mechanical: Food delivered by auger. The force feeder adapts the amount of food to each animal;

Mechanical dose: as above but every duck receive the same amount of food;

Pneumatic/hydraulic: Pneumatic or hydraulic device, every duck receives the same amount of food.

Groups with different letters are significantly different ($P<0.05$)

5. 5 Conclusion

In conclusion, there is good evidence that liver structure and function that would be classified as normal is severely altered and compromised in force fed ducks and geese, but that lipid metabolism biochemical pathways are still functioning normally, albeit at an increased rate. Other clinical signs that force fed birds exhibit which are not seen in age matched birds fed ad libitum on a 'natural' diet include: loose faeces, wet neck, increased time spent sitting and less time carrying out active behaviours, some aversion to the feeding process, increased incidence of bone fractures and liver lesions at the abattoir. Continued feeding would almost certainly result in an earlier death. Other areas of concern where there is a serious lack of data include: mineral metabolism and corresponding hormonal homeostatic controls, examination of the oropharynx for tissue damage, and ascertaining the adaptation times required to mitigate the gag reflex on force feeding.

The mortality rate in force fed birds varies from 2% to 4% in the two week force feeding period compared with around 0.2% in comparable ducks.

6 SOCIO-ECONOMIC ASPECTS OF IMPROVING THE WELFARE OF ANIMALS USED IN THE "FOIE GRAS" INDUSTRY

6.1 Introduction

The extent of production of foie gras in Europe is summarised in Chapter 2 but further information about the extent of the industry in France and the consumption of foie gras is given here. The Committee is grateful for the assistance of Dr Mainsant[1] who provided the material on which much of this chapter is based. This description is followed by consideration of various possible changes in the housing and management of geese and ducks used for foie gras production and their consequences for the public and the industry.

6.2 The foie gras industry in France

The world production of unprocessed foie gras for 1996 is estimated at 15,000 tonnes, of which 70% of the production was in France, 5% in the remainder of the European Union, and 25% in other countries. In the European Union, the main producer after France is Belgium, followed by Spain. Outside the European Union, foie gras is mainly produced in Eastern European countries and Israel, but also in Tunisia, Madagascar, China, and a few other countries e.g. in South America.

The general figures of the foie gras industry in France are given in Table 4.

In the European Union, outside France, foie gras production provides employment for the equivalent of up to one thousand full-time positions. In the Eastern European countries, which may one day join the European Union, employment is the equivalent of four thousand full-time positions.

85% of world consumption takes place in France, which emphasises the importance of the French tradition. More than half of the non-French production is destined for the French market taking into account the French exports. The world consumption, France excluded, amounts to about 2,300 tonnes, compared with 13,000 tonnes in France and a quarter of this non-French consumption is provided for by the French industry.

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[1] INRA, Ivry, France

In France foie gras is no longer reserved for the privileged few. At the present time, it is estimated that foie gras is consumed at least once a year by 4 in 10 French people and that on average they consume it on approximately 10 occasions per year. Two thirds of the annual consumption takes place during the end of the year festivities. Outside France, foie gras consumption concerns a wealthy minority of connoisseurs from developed countries.

In France, consumption in the home represents half of the national consumption. The fact that half of the consumption takes place in restaurants, while the French only eat 15% of their meals away from home also shows that foie gras consumption is associated with people who patronise restaurants and with the more festive events. All high class French restaurants currently have foie gras on their menus throughout the year whilst in the South West of France foie gras is also served in a great percentage of normal commercial restaurants.

Table 4. Figures for the French foie gras industry in 1995

	Activity	Number of Enterprises	Number of people employed (1)	Full time equivalent positions (2)
selection – breeding	400,000 ducks	4 companies	1,000	500
egg incubating		40 units		
rearing – force feeding	19,000,000 animals	15,000 farms	19,000	4,000
slaughtering (3)	12,000,000 animals	35 abattoirs		
cutting up	14,500,000 animals	120 factories	6,000	6,000
processing	6,400 tonnes of liver (4)	500 factories	4,000 (contract workers)	
consumption	12,500 tonnes of liver			
Total direct employment			30,000	10,500

(1) INRA using information from CIFOG
(2) excluding on farm slaughtering
(3) estimation by INRA
(4) including prepared products

6.3 Consequences if there was no change in legislation or practice

In recent years, more and more consumers, within the European Union and elsewhere, have altered their food purchasing and consuming habits because of concerns about their own health, the welfare of the animals used in production and the impact of the production system on the environment. Some of these concerns have resulted in short-term avoidance of a particular product because of a health scare whilst others have been long lasting such as in some vegetarians. Most concerns, however, result in discrimination against specific products, especially where alternatives exist (Broom 1994).

There are many people within the E.U. who will not eat foie gras because of concern about the welfare of geese and ducks which are force fed. Indeed force feeding is forbidden by law in some countries. No published survey of public attitudes in this area is yet available but some producers have already taken account of the trend. In France and some other countries, however, the consumption of foie gras has been increasing rather than decreasing in recent years as the price of the product has declined consequent upon the change from the use of geese to the use of ducks which reduced the production costs. No study has been done to analyse if this increase in consumption will continue in the future or not and if the welfare concern will change the public demand. However, as more and more people in France become concerned about animal welfare, it seems likely that foie gras sales will be affected. If the production could be said to have no adverse effect on animal welfare, sales are very likely to be greater. It is clearly in the interest of the foie gras production industry for the product to be perceived to be acceptable on animal welfare grounds. If no publicly acceptable action to improve animal welfare is taken, a slow or rapid decline in foie gras sales is possible. This would affect imports from third countries unless these countries improved animal welfare. If the third country producers improved animal welfare and hence the public image of their product, before E.U. producers did so, the E.U. producers could lose much of their market. Some producers have already taken in account that trend. For example, the experts of the group had the opportunity to visit a well-known processor of foie gras product which imposes specific management practises to the farmers in order to improve the welfare of the animals. In particular ducks must be in groups during the force feeding period.

6.4 Socio-economic consequences if force feeding was banned

Several points could be important if a ban on force feeding was decided. The first one is the existence of alternative products which could be obtained without force feeding the animals or the existence of specific management excluding force feeding which result in the production of fat livers. The second one is on the Trade Agreement between the European Union and countries from other part of the world.

If force feeding does not occur, but birds are encouraged to feed ad libitum, the liver which is produced using the conventional diet is different, in particular because it includes less fat in the fat cells than the one from force fed animals. Different types of products, described in chapter 2, include fat liver from ducks and geese in different proportion from 100% to 20%. Other products with lean liver are also on the market. Up to now, the products from non-force fed birds have different markets so these cannot be said to be substitutes for the foie gras products. It is clear that work on alternative production methods is urgently needed within the foie gras industry and that the scope for the most rapid development is from the attempt to prepare a product from the livers from ad libitum fed birds and other materials.

A procedure for foie gras production which has been investigated in the past is the destruction of the appetite regulating centres in the brain. However, considering that the objective is to improve the welfare of the animals, this technique, achieved either by surgical or chemical means, is not appropriate. In the long term, it cannot be excluded that other means for increasing appetite will be developed: genetics, manipulating the composition of food or the feeding reflexes. It would be useful to consider the development of research programmes of this type but results would not be available for some years and up to now it is not possible to produce foie gras without force feeding the animals.

A ban on force feeding is likely to cause a considerable reaction from those involved in the foie gras industry, especially among the farmers and processors, as well as the public in general. The irritation of the 30,000 people directly concerned with the production would also be shared by restaurant owners and the consumers themselves because the consumers are also strongly attached to the regional and national origin of this product. The current fashion for local products can only reinforce this emotion and one could imagine a degree of public incomprehension when confronted with a ban on foie gras in the South West of France.

In Europe, an extreme option would be to prohibit production, import and distribution of foie gras produced by force feeding. Its consequence would be to abolish the consumption of foie gras in Europe. The French industry employs about 30 000 people involved in all aspects of production (from incubating the eggs to processing the livers) of whom 90% are situated in two regions of the French South-West (Aquitaine and Midi Pyrénées). Most of these two regions are under European programmes for rural development. These 30,000 people are not employed full-time and one could estimate that the foie gras activity represents 10,500 full-time equivalent positions (incubating, rearing, force feeding, slaughtering, processing) to which can be added a further 2 to 3 thousand indirect full time equivalent positions (suppliers of equipment, machines, feed, veterinary drugs, building constructors, veterinarians, commercial agents, transport companies, researchers). However, even though the French industry uses only 12 to 14 thousand full time equivalent positions, it is 30,000 jobs that would be put in jeopardy by the disappearance of foie gras production, due to the income that would be lost to each enterprise. One should expect the development of clandestine production and its marketing. A portion of the consumers would support the claims of the producers and would be tempted to buy foie gras from illegal clandestine production for which the prices would be very high.

If prohibition of production was not followed by a banning of imports, it would provoke a relocation of the production to other countries, chiefly in Eastern Europe: Hungary, Bulgaria, Romania, ex-Yugoslavia, Czech Republic, Slovakia, ex-USSR but also in a number of other countries (Tunisia, Madagascar, South American countries, Middle East, Far East and China). Instead of importing 20% of the amount processed in the country, France would have to import its total requirement (13,000 tonnes of unprocessed foie gras, 1,500 million FF). The production of fresh foie gras (without considering its preserving) concerns about 19,000 people and represents 4,000 full time equivalent positions. Abroad, there is no technical limit to the production and this European measure would represent a genuine windfall for countries that are already producing foie gras. The expertise is already present in a great number of countries. The relocation of the production might also result in a relocation of the European processing which is almost exclusively French. Again prohibiting force feeding in Europe would not prevent the development of clandestine production especially if the marketing of foie gras remains authorised.

6.5 Improvement of management for welfare reasons and the economic consequences

If the force feeding procedure continue, measures should be taken to avoid as many as possible of the negative effects of the management during the force feeding period. Several points can be considered.

The first one concerns the individual cages in which animals are held during force feeding. It is part of the general problem faced by industrial animal rearing (pigs, broilers, turkeys, laying hens, calves). In the case of force feeding, the animal cannot turn around in its cage, stand in a normal position, preen normally or spread its wings. First of all it should be noted that the use of cages only concerns ducks and represents 80% of the duck liver production. Geese and the remaining 20% of ducks are held in enclosures and the animals can move around several square meters.

Alternatives to the cage system exist and are well developed. From the point of view of animal welfare these enclosures should not pose any problems in respect to the norms for maximum density. By contrast, from the farmer's point of view they are much more arduous than individual cages. In respect of the cost of labour, individual cages, always coupled with pneumatic or hydraulic force feeders, permit the feeding of twice as many animals by one person. Despite the investment involved, the system of individual cages is becoming widespread in all units of production of a significant size.

In order to improve animal welfare, the use of individual cages might be permitted with sufficient increase in space to permit significant mobility of the animals but the efficiency of such large cages has never been investigated. The elimination of individual cages in favour of enclosures would have as a main consequence a very significant increase of the cost of production mainly due to the increase in labour cost.

There would also be a capital cost as the investment in cages is recent for most farmers. Any increase in cost could strongly affect the competitiveness of European products compared with imported ones. There is a risk of relocation of the production to other countries.

The other point concerns the methods, rate and amount of force feeding. It is not in the interests of farmers to cause injuries to birds used for foie gras production. However it is desirable for measures to be taken to reduce the incidence of any handling which results in poor welfare. A requirement to check birds for injury and to keep records of injury and mortality would require some labour costs but might improve sales by improving the public image of the industry.

Machinery for feeding birds very fast may have some adverse effect on bird welfare even if data does not exist. If the speed of food delivery were to be limited, more labour time would be required for feeding a given number of birds.

The amount fed to birds at a feed, or the maximum number of meals per day, or the amount of dry matter as a function of body weight, or the number of days of force feeding might be limited. Any of these changes would add to the cost of the product but it is likely that sales would not be substantially affected. Competition from third countries would have to be considered.

7 RESEARCH

7.1 Alternative Methods of Production

Research has been or should be carried out into methods of producing fat liver which do not require the use of force feeding.

Aufray et al. (1970, 1973) have experimented with new technical approaches in order to obtain fat liver without force feeding. These authors tried first to destroy the medio-ventral nucleus of the hypothalamus of geese by electrolytic lesion in order to induce hyperphagy. They obtained hyperphagy effectively for a short period, so that the animals had an increase in body weight and in the weight of the liver, but the weight increases were lower than those obtained with animals which were force fed. In the second approach, the researchers injected 6-hydroxy dopamine intracerebrally with the aim of inducing a degeneration of dopaminergic nerves. 6-hydroxy dopamine was delivered directly into the third ventricle and it was observed that animals developed obesity and hepatic hypertrophy. However, the weight increases were lower than those obtained with force fed animals. These methods have not been used commercially.

The other possibility for fat liver production could be to feed *ad libitum*. The resulting product, however, is not what is demanded by the consumer. The liver includes fat but to a much lower degree than in force fed birds. It might be possible to breed birds for a larger appetite. If this were done, it would be important to ensure that the resulting increases in the sizes of the body as a whole, or of particular organs, did not result in poor welfare, for example because of leg pain or organ malfunction.

If birds with good welfare and a large, but not pathologically changed, liver are produced, a high fat content pâté would have to be produced by the addition of fat.

7.2 Suggestions for Future Research

The examination of the welfare of force fed ducks and geese has been very difficult because of the lack of information available. Considerable research is needed in order to better evaluate the welfare of the force fed animals.

7.2.1 Health of the animals

The first and more important point is the health status of the force fed animals.

- Mortality and morbidity data of force fed animals and non force fed animals should be obtained.
- The health and the presence of pathology in different organs should be determined at the end of the force feeding period, including the oropharynx, oesophagus, liver, joints and foot, and compared with non force fed animals.
- The occurrence of disease, in particular, bone fractures and respiratory disease should be determined in terms of their aetiology and incidence in the different management systems.
- Statistics on the use of antibiotics and other drugs in these production systems should be obtained.

7.2.2 Feeding methods

- The reaction of the animals to the force feeding procedure should be determined.
- The effects on the birds of the competence and management behaviour of the persons working in the units
- The effects of the different devices used for force feeding should be evaluated.
- The dietary components of the animals could be changed to improve the digestion and liver metabolism.
- Studies on the physiology and genetic variability of the ducks and geese for eating large amount of food and for naturally having more deposits in the liver are needed. In such work, new genetic strains whose welfare is poor should not be continued.

- 7.2.3 Housing

- Investigation on the floor space requirements and on the optimal group size would help to determine the best housing systems. It should include studies on the flooring materials, in particular to avoid foot problems.
- water requirements for drinking, preening and swimming are needed.
- determination of the optimal climatic environment (temperature, humidity, air speed,...) is required.

- 7.2.4 Socio-economic factors

- Public perception of foie gras in different European countries.
- Interest of the consumers for new products which do not contain liver from force fed birds.
- Description of the foie gras industry.
- Influence of different constraints on the foie gras industry.

8 SUMMARY, CONCLUSION AND RECOMMENDATIONS

8.1 Summary

There have been many scientific studies of the welfare of farmed poultry but only a few of these have concerned the welfare of force fed ducks and geese. The following conclusions are based on these studies and on general information concerning the welfare of animals

- I. Foie gras and the ingestion of large quantities of food

1. Foie gras products are obtained at the present time from the livers of force fed ducks and geese and these livers are characterised by their large size and high fat content. There is a current E.U. Regulation 1538/91, and there are regulations in member states, which define a minimum weight for a liver and a minimum fat content for a liver to be used for foie gras production.

2. During the force feeding period, birds which had previously been fed an increasing but limited amount of food are forcibly fed large amounts of food twice per day for about two weeks (ducks) or three times per day for about three weeks (geese).

3. The production of foie gras by force feeding geese *Anser anser* has a long tradition, particularly in south west France, but beginning around 30 years ago the Mulard duck, a hybrid between the muscovy duck *Cairina moschata* and the domestic duck *Anas platyrhynchos*, has come to be used extensively (94% of foie gras production in 1995).

4. Of the three species mentioned in paragraph 3 above, wild members of the domestic goose species are often migratory, wild members of the domestic duck are sometimes migratory, but wild muscovy ducks are non-migratory. Migratory birds store food reserves prior to migration and the liver is one of the organs in which food reserves are stored. The procedure used for the production of foie gras may in part utilise such storage mechanisms and result in an increase in the size of the liver to about 6-10 times the normal liver size of a bird.

5. The amount of food fed during each force feeding is considerably more than normal intake and is the same as that recorded as being voluntarily eaten by ducks after being deprived of food for 24 hours. However, as the procedure is repeated 2-3 times a day, the quantity of energy rich food (maize) which the birds are forced to ingest during the two or three weeks of force feeding is much greater than that which the birds would eat voluntarily. If force feeding is stopped, the birds greatly reduce their food intake for several days.

6. The changes in hepatocytes and other cells in the liver of force fed ducks and geese are substantial. The most obvious change is the increase in the number of large fat globules visible in the cells. A limited increase in the presence of fat globules in liver can occur in normal liver in certain conditions but no normal animal has steatosis of the liver to the extent which occurs in all force fed birds. During the force feeding period, liver function is impaired. Some pathologists consider this level of steatosis to be pathological but others do not. The steatosis is reversible in many birds but reversibility exists for many pathological states.

7. Force feeding results in an increase in liver size to the extent that the abdomen expands. Logically this should result in the legs being held further away from the midline of the body, making locomotion more difficult. Panting occurs more often than in ducks or geese which are not force fed. Some members of the working group have observed this displacement of the legs and panting. This might cause pain and distress but no scientific study has been carried out on this.

8. Hypertrophied livers can cause discomfort in a variety of other species. Hence it may be that some discomfort results directly from the hypertrophied liver in force fed ducks and geese. It appears that this has not been investigated.

9. The large amount of food which is rapidly intubated during the force feeding procedure leads to immediate oesophageal distension, increased heat production and panting, and production of semi liquid faeces.

10. Those who conduct force feeding limit its duration and, in general, endeavour to avoid excessive steatosis that can result in livers of poor quality and eventually in death.

11. Surveys on mortality rates or losses during the two weeks of the force feeding period were carried out in France, Belgium and Spain. The mortality rate in force fed birds varies from 2% to 4% in the two week force feeding period compared with around 0.2% in non force fed ducks There is considerable variation of the figures between farms, batches in the farms. and seasons. The precise causes of this mortality have not been documented but are likely to include physical injury, heat stress and liver failure.

12. There is some evidence indicating that if ducks or geese are force fed for longer than that which occurs commercially, mortality can be very high, largely as a consequence of failure of liver function. Hence it is clear that steatosis and other effects of force feeding are lethal when the procedures are continued. If force feeding is stopped and normal feeding resumed, mortality rates return to normal. However, the mortality rate if the steatosis is maintained at the level which occurs at the end of force feeding is not known.

- II. The Force feeding Procedure

1. The force feeding procedure deprives the bird of an important behaviour which is normal feeding.

2. The problems of the force feeding procedure itself are : (1) handling by humans which, in the commercial force feeding situation, can cause aversion and discomfort for ducks and geese, (2) the potentially damaging and distressing effects of the tube which is inserted into the oesophagus, (3) the rapid intubation of a large volume of food.

3. Pituitary adrenal activity does not appear to be enhanced by the force feeding procedure.

4. Various techniques are used for force feeding. Since these differ in the way and the rate food is delivered, they probably differentially impact on the welfare of the birds but those impacts have not been studied.

5. Members of the Committee observed that, prior to force feeding the ducks and geese show avoidance behaviour indicating aversion for the person who feeds them and the feeding

procedure. After a short period, birds which are able to do so move away from the person who force fed them. However there is no conclusive scientific evidence as to the aversive nature of the force feeding process.

6. The procedure of force feeding has been said to result in the presence of accumulated scar tissue in the oesophagus of ducks. If this organ has sensory innervation, this might indicate that there is pain during the force feeding procedure. However, it is not known how often injury or pain occurs and those conducting force feeding endeavour to avoid injury to the ducks and geese since injury to the birds at this time can cause mortality.

7. Geese and ducks do not have a crop. The increasing amount of food given prior to force feeding and the force feeding itself cause expansion of the lower part of the oesophagus. The risk of damage to stretched tissue is greater than that to normal tissue but it is not known how great this risk is in force fed ducks or geese.

- III. Housing systems

1. During the rearing period prior to force feeding, the birds are reared in a group, usually with free access to outdoors. With the exception that the ducks and geese may not be provided with sufficient water for swimming and preening, no particular welfare problems are evident.

2. During the force feeding period, the traditional housing system is to keep the animals in small groups on slatted floors. In the past 10 years, new housing systems have been developed for the ducks. In those systems animals are kept in small individual cages, with wire or plastic mesh floors. During the two weeks of the force feeding period the small cages do not allow the animals to stand erect, turn around or flap their wings.

3. A high percentage of ducks force fed in individual cages have lesions of the sternum and bone fractures at the abattoir. The use of cages obviates the necessity to chase birds before

catching hold of them to feed them but this advantage is counterbalanced, as far as bird welfare is concerned, by the restrictions placed upon the birds' movements by the individual cages.

4. Poor quality floors may cause foot injuries. However, the relationship between the type of floor and foot injuries has not been studied.

5. Ducks and geese are social animals. The housing systems for force fed animals must interfere with their social behaviour but there is no information about the extent of this or if abnormal behaviour such as feather pecking might develop.

6. During the force feeding period, ducks and geese are sometimes kept in near darkness except when being fed. This prevents normal investigatory behaviour, tends to prevent normal exercise and results in poor welfare.

7. Ducks and geese require water for preening and they have a preference to swim.

- IV. Socio-economic consequences of regulation for the welfare of the animals

1. The foie gras production and processing industry within the European Union is mainly concentrated in France. The total direct employment is about 10,500 full time equivalent positions in France and up to 1,000 in other member states.

2. In France a large proportion of the population consume foie gras at some time during the year, principally at festive periods and in restaurants. In the remainder of the EU, that consumption is limited to a wealthy minority of connoisseurs.

3. Foie gras consumption has increased in recent years as the selling price has declined. Public concern about welfare might affect this trend.

4. The abolition of the use of individual cages during the force feeding period would have a significant cost but is practicable, especially if imported products could be controlled in the same way.

5. The costs of modifying the handling, rate of feeding and amount of feeding in order to make small improvements in animal welfare are not likely to be great but competition with third countries needs to be considered and the consequences of those changes have not been studied.

6. Alternatives to foie gras produced by force feeding have not been adequately studied and it is not clear whether or not there can be products which would be acceptable on animal welfare grounds, palatable for the consumers and valuable to farmers.

7. If there are no alternatives to foie gras production using force feeding, a ban on force feeding would affect all or most of the jobs in the industry, whether or not imports were also banned. It would also likely affect French consumer's behaviour and favour the development of parallel markets. Changes in legislation might encourage the development of alternative products involving better welfare.

8.2 Conclusion

The Scientific Committee on Animal Health and Animal Welfare concludes that force feeding, as currently practised, is detrimental to the welfare of the birds.

8.3 Recommendations

8.3.1. General statement

Force feeding is a technique that has been developed in order to produce a product, foie gras, that is highly appreciated and actively sought by an important number of consumers, especially in France, a country with a long tradition of foie gras consumption at festive events and is becoming more frequently consumed. However, the management and housing of the birds used for producing foie gras have a negative impact on their welfare.

It should be noted that these are the only farm animal that are force fed and in some countries this procedure is prohibited.

The physical characteristics of foie gras and its composition are an important aspect of the value of the product. With current regulations it is not possible to replace foie gras by alternative products even though preparations made from livers of non force fed animals are on the market.

Since foie gras needs to be produced in order to satisfy the consumers' demand, it is important to produce it in conditions that are acceptable from the welfare viewpoint and do not cause undue suffering. Consumers and producers should be informed of the effects of foie gras production methods on the welfare of the birds. Such information could promote appropriate changes in the industry. The traditional technique of force feeding has been substantially modified during the past thirty years to rationalise and industrialise the production of foie gras and increase profitability. This has impacted on the animal species that is submitted to the process, housing conditions, and food composition and delivery. These modifications have been introduced without paying attention to animal welfare considerations. There is evidence that not only animal welfare has not benefited from the change but that instead it has deteriorated. It is therefore important to assess the exact way animal welfare is affected by currently used force feeding procedures and to determine what can be done both immediately and in the longer term so as not to cause avoidable suffering.

- 8.3.2. The exact impact of currently used force feeding techniques on animal welfare

1. The impact of the different techniques and housing systems which can be used to produce foie gras should be better documented,

2. In particular, although there is evidence that large variations in mortality and morbidity exist between farms and batches, the exact roles of production and management factors have not been systematically investigated.

- 8.3.3. Solutions for improving the welfare of birds kept for foie gras production

There must a ban on the techniques that cause avoidable suffering. The objectives are, by order of priority:

- a. to reduce mortality and morbidity rates,
- b. to decrease the amounts of pain and distress that are endured in the process,
- c. to allow the animals to engage in normal behavioural activities

- 8.3.4 The specific recommendations are:

a. No process should be used that results in an increase in liver size such that its function is significantly modified or that it directly or indirectly causes increased mortality, pain, or distress to the animal.

b. No feeding procedure should be used that results in substantial discomfort to the animals, shown by aversion to the feeding procedure or any other indicator of poor welfare in the birds. Automatic feeding devices should not be used unless proved to be safe for the birds.

c. All persons in charge of birds kept for foie gras production should be properly trained and competent.

d. The use of small individual cages for housing these birds should not be permitted. Birds should be kept in social groups and be provided with adequate water and light sufficient for normal behaviour. Birds should be able to stretch their wings, preen themselves normally, walk and show normal social interactions.

e. All flocks should be subject to an official monitoring programme in which morbidity, mortality and other welfare indicators are recorded. Such programmes should include provision for immediate action when problems are detected. Records should be available for external audit.

f. Research should be carried out as detailed in Chapter 7.

g. The Committee is aware that many of the facts mentioned in the report are based on a relatively small number of scientific publications or on individual observations of experts deriving from visits of farms. The evidence however suggests that it is very important for the further development of foie gras production to introduce alternative techniques that do not require force feeding. This has to include new techniques (e.g. in breeding) as well as a better understanding of the mechanisms that regulate feeding behaviour in ducks and geese and the mechanisms that are involved in steatosis.

8.4 Minority Opinion - Dr D.J. Alexander

Although he endorsed the Report as a well-balanced factual account of the animal welfare aspects of the production of foie gras, Dr Alexander was unable to agree fully to the Recommendations made. In his opinion, based on the animal health and welfare data presented in the Report, the only recommendation that the Committee can properly make is that force feeding of ducks and geese should stop and that this could best be achieved by the prohibition of the production, importation, distribution and sale of foie gras. He agrees that should the Commission decide that foie gras production should continue, for example due to the socio-economic impacts discussed in Chapter 6 of the Report, then the recommendations in section 8.3.4 a-g should be enforced.

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10 Acknowledgements

This report of the Scientific Committee on Animal Health and Animal Welfare is substantially based on the work of a working group of the Committee.

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Fatty liver (hepatic lipidosis; hepatic steatosis) is a serious disease that can arise from a variety of causes. It is deliberately given to all ducks or geese raised for foie gras ("fatty liver"), since the enlarged, fatty liver is considered a delicacy.

Presence of disease is suspected from viewing the grossly enlarged (14 oz. to 1.5 lbs.), beige-colored liver; diagnosis can be confirmed with biopsy or necropsy (lab sheet #1).

Fatty liver can also be diagnosed if the liver contains over 5% fat – [Biochemical Toxicology, E. Hodgson & P. Levi, p.460, Simon & Schuster 1994]. Based on laboratory analysis, livers of foie gras ducks contain 65% fat (lab sheet #2).

Animals in this condition would feel extremely ill, suffering from systemic effects of liver disease.

Foie gras production, by definition, constitutes clear-cut animal cruelty.

THE UNDERSIGNED NEW YORK STATE LICENSED VETERINARIANS SUPPORT ANTI-FOIE GRAS LEGISLATION.

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BEFORE THE NEW YORK STATE DEPARTMENT OF AGRICULTURE AND MARKETS
Albany, New York

In the Matter of the Petition of THE HUMANE SOCIETY OF THE UNITED STATES, ET AL. for a Declaratory Ruling	)))))))	Index No.

AFFIDAVIT OF DR. GREG J. HARRISON, DVM, DABVP, DECAMS

Dr. Greg J. Harrison, being duly sworn, deposes and says:

1. My name is Dr. Greg J. Harrison. I submit this affidavit in support of the Petition for a Declaratory Ruling, based upon my education, training, experience, research, review of evidence specific to this matter, and where applicable, my personal knowledge.

2. I received my DVM from Iowa State University in 1967, and later became a Diplomate of the American Board of Veterinary Practitioners specializing in avian medicine, and a Diplomate of the European College of Avian Medicine and Surgery. There are currently only seven other veterinarians in the United States and European Union who are double-boarded avian specialists.

3. Early in my practice I established The Bird Hospital, the first Florida practice exclusively developed for pet bird medicine and surgery. In 1997, I was awarded the Stange Award, Iowa State University's highest honor for contributions to the veterinary field. I recently published a two-volume avian veterinary textbook, entitled Clinical Avian Medicine, and along with coordinating over 50 co-authors, I contributed to the writing of several of its chapters. Furthermore, I have contributed to other major textbooks in veterinary medicine and aviculture. See my curriculum vitae, attached hereto as Exhibit A.

4. In preparing this affidavit, in addition to literature on the subject of foie gras production, I reviewed 1) the affidavit and report of Dr. Robert Schmidt, a veterinary pathologist that examined tissue samples taken from birds used in foie gras production, 2) two sets of necropsy reports created in 2002-2003, and 2005, at Antech and Cornell University laboratories respectively, based

on animals used to produce foie gras, 3) a March 20, 2006 Dairy One feed analysis based on feed used in the foie gras production process, 4) the National Research Council (NRC) 1994 Requirements for Poultry- including chapter 5 on ducks, and 6) the listed references throughout this affidavit.

5. The tissue samples analyzed by Dr. Schmidt, as well as the 2002-2003 and 2005 necropsies, describe several different livers indicating various forms of what is generally known as hepatic lipidosis, a disease indicated by yellow discoloration and hepatomegaly (enlargement) of the liver due to fatty degeneration and subsequent impairment of the parenchymal cells, which can eventually lead to liver failure and death of birds diagnosed with it.[1] Put simply, the cellular changes associated with hepatic lipidosis alter the ability of the liver to function normally, resulting in impaired animal health and if left untreated, death.

6. In pet birds, fatty liver disease is common in cockatiels, Amazon parrots, and Quaker parrots. It is a serious condition; death may occur if treatment is not started early after its onset. It is normally caused by overfeeding energy-rich diets combined with nutritional deficiencies. Hepatic lipidosis often causes a sudden loss of appetite, lethargy and depression. Physical examination normally reveals a distended abdomen (caused by the hepatomegaly), and as a result of increased pressure on the lungs and related respiratory complications, the birds will often have visible difficulty breathing.

7. At some point in the process of the degeneration of the liver cells, hepatic encephalopathy, or abnormal brain function caused by passage of toxic substances from the liver to the blood, normally occurs, causing seizures, opisthotonos and other signs of nervous system impairment. Birds suffering from hepatic lipidosis do not always exhibit these symptoms, and may die suddenly without such overt signs.

8. I have read the affidavits of Dr. Robert E. Schmidt, and Dr. Yvan Beck, and their conclusions, based on the literature they cite, are consistent with my understanding of the disease and its pathogenesis. Furthermore, the 2002-2003 and 2005 necropsies indicate animals that were suffering from this disease, and that in addition showed several related untreated complications.

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[1] Olsen, GH; Orosz, SE. Manual of Avian Medicine. Mosby, Inc. St. Louis, MO; 2000; Altman, RB; Clubb, SL; Dorrestein, GM; Quesenberry, K. Avian Medicine and Surgery. W.B. Saunders Co. Philadelphia, PA; 1997

9. Consistent with my understanding of the pathogenesis of the disease, published studies have shown that species of ducks force-fed specific diets to produce foie gras develop heaptic lipidosis (also known as hepatic steatosis). (Hermier 2003).[2]

10. In addition the studies cited by Dr. Schmidt and Dr. Beck, the Hermier study found that "certain genotypes may be more responsive to the dietary induction of fatty liver because of a less efficient channeling of hepatic lipids towards secretion into plasma and adipose storage, and the duck may represent a suitable model in which to study the development of hepatic steatosis and its pathogenesis." (Hermier 2003, page 663)[2]The study concluded in part that "overfeeding of ducks results in metabolic adaptations that resemble the features of metabolic syndrome in overeating [human] patients." (Hermier 2003, page 673)[2].

11. The Hermier study focused on the inability of Muscovy duck, relative to the common duck, to resist hepatic lipidosis, and suggested that the former was less efficient at recycling fatty acids between the adipose tissue and the liver – specifically that the capacity of VLDL secretion seemed lower in the Muscovy duck, making it prone to hepatic lipidosis rather than extrahepatic adiposity. (Hermier 2003, pages 671-673) [2].

12. As described by Hermier (2003, page 664)[2] accumulation of fat in the liver is a natural process that allows birds to store energy for later demands. Commercial production of foie gras has taken advantage of this. By overfeeding excess energy in the form of carbohydrates (with concurrent low protein, fat, vitamins and minerals) the fat deposition becomes excessive. The Dairy One feed analysis shows nutrient levels in the feed sample for protein (10%) and fat (4.4%) that are low. The NRC Nutrition Standards for Poultry 1994 has recommendations for ducks, based on age and production status, at 15-22% for protein. Hyde recommends 5-6.5% fat (Olsen, 1999)[3], while NRC only lists 1% of the fatty acid lysine as a requirement.

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[2] Hermier D, Guy G, Guillaumin S, Davail S, Andre JM, Hoo-Paris R, Differential channelling of liver lipids in relation to susceptibility to hepatic steatosis in two species of ducks, Comp Biochem Physiol B Biochem Mol Biol, 135(4):663-75, 2003.

[3] Olsen JH: Anseriformes. In Ritchie, BW, Harrison, GJ, Harrison, LR (eds): Avian Medicine: Principles and Application. Brentwood, TN, HBD Intl Inc, 1999, p 1248.

13. Furthermore, the NRC requirement for calcium is 1%; The Dairy One result is 0.33. The ratio of calcium to phosphorus for NRC is 2:1; the Dairy One result is 1:1. There is no analysis in the Dairy One formula for vitamins. According to Beck's affidavit (paragraph 23), foie gras production feeds are intentionally imbalanced and nutritionally deficient to intentionally cause hepatic steatosis. Lack of vitamins A, B and E also contributes to fatty liver disease (Harrison, GJ, 2006)[4].

14. The above factors, when combined with force-feeding excessive quantities of energy-rich food, lead to rapid fat accumulation. According to Hermier (2003, page 664)[2] the foie gras industry has selected breeds that store fats in the liver rather than develop uniform fat deposition throughout the entire body. The excess fat in the liver cells is accompanied by elevations in the triglycerides and cholesterol, specifically VLDL (Hermier 2003, pages 664, 673)[2]. The liver's function as the body detoxification center is reduced. The body's metabolic process is subsequently impaired.

15. The lack of sufficient protein, vitamins and minerals (calcium) leads the young birds' rapidly growing bones to be structurally flawed (osteodystrophy). This leads to bending and breaking (rickets). These latter imbalances also lead to a skin disorder known as hyperkeratosis (thinning, flaking, excess callus formation, slow healing). The bone pain combines with the lethargy from the toxins and leads to further immobilization of the bird. This lack of exercise leads to poor circulation in the feet. These factors combine with the hyperkeratosis to allow ulcers to form on the bottom of the feet. These become infected, red and swollen. Pain and bacterial toxins further complicate the situation.

16. In some cases the liver's failure leads to a deficiency of clotting factors and the bird bleeds to death. Bleeding into tissue is reported as painful in people. Consistent with this, Dr. Beck (paragraph 14) points out that the mortality rate for foie gras production is 10-20 times higher than traditional meat production for the same species. The symptoms associated with situtations in which the liver tissue cells fail to function are not all apparent and are easy to ignore (Hochleithner M., 2006).[5]

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[4] Harrison, GJ: Nutritional Considerations. In Harrison GJ, Lightfoot TL (eds): Clinical Avian Medicine. Palm Beach, FL, Spix Pub Inc, 2006, pp 131-132.

[5] Hochleithner M et al: Evaluating and treating the liver. In Harrison GJ, Lightfoot TL (eds): Clinical Avian Medicine. Palm Beach, FL, Spix Pub Inc, 2006, p 242.

Table 15.1 | Clinical Signs of Liver Disease

17. For decades veterinarians failed to recognize such suffering in birds and only recently has the subject been even superficially addressed (Paul-Murphy J., 2006).[6] In pet parrots fatty liver disease is the common sequela brought on by feeding high energy diets of fatty seeds with no vitamin or mineral supplements. Although many birds are asymptomatic, many suffer from similar situations discussed for the foie gras birds, and many die despite treatment.

18. Pet birds that are treated for liver failure and start to recover often continue to improve when put on proper diets. The slow loss of function can be difficult to detect as stated though, and things like bumble foot (pododermatitis) are often overlooked. (Olsen JH, 1999)[3]. Ionized calcium (Stanford, 2006)[7] and LDL:HDL ratio (Harrison, GJ, 2006 (Bavelaar))[4] can predict such diseases, though its expression varies with individuals, species, season, age and sex. While complete diets,

Clinical Sign	Non-specific	More Specific
Anorexia	✓	
Lethargy	✓	
Weight loss	✓	
Weakness	✓	
Diarrhea	✓	
Polyuria	✓	
Polydipsia	✓	
Poor feathers	✓	
Dyspnea	✓	
Green or yellow urates		✓
Abdominal swelling		✓
Ascites		✓
Coagulopathies		✓
Melena		✓
Abnormal beak/nails		✓
Malcolored feathers		✓

[6] Paul-Murphy J: Pain management. In Harrison GJ, Lightfoot TL (eds): Clinical Avian Medicine. Palm Beach, FL, Spix Pub Inc, 2006, pp 233-239.

[7] Stanford M: Calcium Metabolism. In Harrison GJ, Lightfoot TL (eds): Clinical Avian Medicine. Palm Beach, FL, Spix Pub Inc, 2006, pp 141-152.

exercise and other factors might prevent this, doing so is apparently contrary to the purposes of foie gras production.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on this day 5/25/06

Dr. Greg J. Harrison, DVM, DABVP, DECAMS

Subscribed and sworn to before me, this day

GEORGINA S. LAGASSE
MY COMMISSION # DD 545577
EXPIRES: June 7, 2010
Bonded Thru Notary Public Underwriters

Seal of the Notary Public

Exhibit A

CURRICULUM VITAE

NAME: Greg J. Harrison, DVM — DATE: April, 2001
ABVP, Diplomate in Avian Practice
ECAMS, Diplomate in Avian Medicine and Surgery, Europe

ADDRESS: The Bird Hospital
6147 Lake Worth Road
Greenacres, FL 33463

DATE OF BIRTH: February 28, 1942

EDUCATION:
COLLEGE: Iowa State University
DATES: 1960 - 1967
DEGREE: Doctor of Veterinary Medicine (DVM)

American Board of Veterinary Practitioners (ABVP)
Certified in Avian Specialty
Diplomate status since 1994
2005 was awarded Emeritus status with ABVP.
ABVP was established to set standards for advanced professionalism in veterinary practice and is sanctioned by the American Veterinary Medical Association (AVMA).

European College of Avian Medicine and Surgery
Diplomate status since 1998.

PROFESSIONAL ACTIVITIES

1967-1985: Private veterinary practitioner in exotics and small animals in Florida. Consultant to Doctor's Pet Center, Dreher Park Zoo, Lion Country Safari; Dozens of pet shops and hundreds of aviaries world-wide.
1977: Hatched and raised the first psittacine ever produced by artificial insemination.
1980-89: Adjunct Professor, Biological Sciences, Florida Atlantic University, Boca Raton, Florida. Dr. Harrison established lectures on Aviculture Science.
1981-89: Consultant to the United States Department of the Interior on the Puerto Rican Parrot Project.
1981-1989: Started Eastern States (now North American Veterinary Conference) Avian Wet Labs and Lectures and ran them for six years.
1985-1992: Public television-30 segments, "Living With Animals".
1986-2004: Owner and operator, The Bird Hospital, Lake Worth, Florida. The practice offered a mentoring experience for veterinary students and veterinarians worldwide.
1986-1993: President, Research Institute for Avian Medicine, Nutrition, and Reproduction, Inc., Lake Worth, Florida. A non-profit organization to educate veterinarians.

1988-1989: Consultant to Ziegler Brothers Inc., animal food manufacturing company of Gardeners, PA.

1991-Present: President and founder HBD, International Inc. a Florida corporation that produced and distributes Harrison's Bird Diets to practicing veterinarians, at HBD International Inc. 7108 Crossroads Blvd Suite 325. Brentwood, TN 37027

1991-Present: Editor and Publisher of HBD's Avian Examiner a quarterly periodical on avian medicine, surgery, practice and the unique properties of Harrison's Bird Diets.

1992-Present: Elleman International, Inc. Veterinary Surgical Instruments, Co. Advisory Board.

1993: Featured on Gentle Doctor, a PBS nationally syndicated program segment on what is new in veterinary medicine produced by Public Broadcasting Channel, Tampa, FL.

1993-1999: Veterinary Forum Magazine, 5460 Buena Vista, Fairway, Kansas, 66205, Veterinary Advisory Board.

1993-Present: Consultant to African Parrot Society.

1995-Present: Consultant and team member on developing avian practices. Medical Management International - Banfield Veterinary Clinics, Portland, Oregon.

1995: MMI Wellness Seminar series speaker sponsored by Waltham, Bayer and HBD, Inc. at University of California, Jan. 7-8, 1995. Several other universities, 1996.

1995: HBD, Inc. and Harrison's Bird Diets, first certified organic product for pets in the world as HBD is accepted by Organic Crop Improvement Association, (OCIA) Inc., Lincoln, Nebraska, as a private label member.

1995-1999: Board of Directors - International Aviculture Society (IAS) a non-profit group supporting proper bird raising and care.

1995-1998: Consultant on Avian Health to PetsMart. America's largest pet store chain.

1996: American Board of Veterinary Practitioners Practical Exam Committee Chairperson and member of ABVP mentoring.

1996: Developed the Levels Program. Avian educational courses for veterinarians and technicians. Delivered to 600 veterinarians in 1996.

1997-2001: The Companion Bird Workshop for the veterinary community at The Bird Hospital Lake Worth, FL/HBD International, Inc., a joint effort.

1999-2003: Nutrition of Pet Birds Lecture University of Florida College of Veterinary Medicine, Gainesville, Florida.

2000-Present: Monitor and answer questions - The Bird Guy, harrison'sbirdfoods.com.

2001-Present: Why Organic? A public service lecture using birds to explain the need for organic sustainable agriculture and purchasing organic products.

SCIENTIFIC ORGANIZATIONS

American Academy of Veterinary Nutrition*
Association of Avian Veterinarians*
American Association of Avian Pathologists
American Veterinary Medical Association*
Florida Veterinary Medical Association*
Palm Beach County Veterinary Society*
American Animal Hospital Association, Member Hospital

American Association of Zoo Veterinarians
American Board of Veterinary Practitioners (ABVP) - Avian Practice - Organizing Committee
American Board of Veterinary Practitioners - Avian Practice - Diplomat certified specialist in avian practice*
European College of Avian Medicine and Surgery - ECAMS - Diplomate*
Mid-Atlantic States Association of Avian Veterinarians
American Veterinary Society of Animal Behavior, Veterinary Behavior Consultations
American Academy of Veterinary Nutrition*
National Wildlife Rehabilitators Association*
*Current

PROFESSIONAL HONORS

1978: Order of AARDVARK by the Morris Animal Foundation, awarded to authors of first book on Zoo Animal Medicine
1982: Recognition in October Better Homes and Gardens article as an avian specialist contact person and having a national consultation service.
1984: Broward County Veterinary Medical Association Speakers Award.
1986: Order of KUKUKIFUKU by the Morris Animal Foundation. For authoring a chapter in 2nd edition of Zoo Animal Medicine
1990: Award for Outstanding Contribution and Commitment to Avian Medicine and the Association of Avian Veterinarians.
1991-1992 Award for Outstanding Service & Commitment to Advancing & Promoting Avian Medicine and Stewardship. Association of Avian Veterinarians.
1992: Miles Inc. Awarded trip to Bonn Germany as recognition of leadership in Avian Medicine. One of ten in the whole profession world wide.
1996: Stange Memorial Award for Meritorious Service in Veterinary Medicine. Iowa State University's most prestigious award offered by the College of Veterinary Medicine to it's alumni.
2001 SCAVMA University of Pennsilvania School of Veterinary Medicine "From School To Success: Shaping the Future of Your Veterianry Career." Speaker.
2001: John Greve Honorary Lecture Series. Iowa State University. Omega Tau Sigma sponser. April 2001.

PUBLIC SERVICE:

1975: Recognition Award for meritorious service to 4-H.
1978: Charter member Aviary and Cage Bird Society of South Florida
1978: The Florida Audubon Society Special Award for service to the Bald Eagle.
1982-1994 President's Advisory Board of The Audubon Society of the Everglades, Inc. West Palm Beach, FL.
1982-1986: The Audubon Society of the Everglades Certificate of Special Recognition.
1988-President Dune Deck Condominium Association, Palm Beach, FL.
1989: Aviculture's Top Gun an article on Dr. Harrison in Bird Talk magazine by Don

Vaughan.

1994-Present: Advisor to Tambopata Research Center - Peru.

1994: HBD, Inc. awarded International Research Foundations plaque for largest corporate donation.

1995-1999: Board of Directors International Aviculture Society.

1995: HBD, Inc. acknowledged by Charles Munn, PhD for contribution for conservation of the Blue-throated Macaw in Bolivia - the largest corporate donor for this wildlife conservation project.

1995: HBD Juvenile Formula chosen by Eduardo Escaveara of Tambopata Research Center - Peru as the best formula tested to feed the macaws in their release project. Based on these studies Dr. Charles Munn, Wildlife Conservation Society, associated with the Bronx Zoo, chose HBD as the formula to be used in the Blue-throated Macaw and the Hyacinth Macaw recovery projects.

1997: Initiated into Mankind Project

2000: Awarded lifetime membership too the Sandoway House Nature Center in Delray Beach, Florida.

2001-present Board of Directors Rachel Carson Council, Inc. PO Box 10779, Silver Spring, Maryland 20914 Tel: (301) 593-7507 rccouncil@aol.com

A nonprofit organization raising awareness of the need for alternatives to pesticides and how to accomplish that.

OFFICES HELD

Association of Avian Veterinarians - President (two terms), Aviculture Committee Chairman, Strategic Planning Committee Chairman, Co-Chairman Organizing Committee for Avian Specialty for American Board of Practitioners.

American Association of Avian Pathologists - Pet Bird Committee, Chlamydiosis Committee, Diseases of Pet Birds Committee, AAV Liaison Committee.

American Association of Zoo Veterinarians - Secretary.

Palm Beach County Veterinary Medical Association - Secretary.

American Board of Veterinary Practitioners - Practical Examination Committee Chairman - Avian, 1996.

CONSERVATION AND ORGANIC/SUSTAINABLE AGRICULTURE

Tambopata Research Center, Tambopata, Peru. Supports World Parrot Trust through donations of bird food (Harrison's Bird Diets) for the macaw project run by Charles Munn (for more about the project see: "Macaws: Winged Rainbows" by Charles Munn, National Geographic, Jan 1994).

Florida Certified Organic Growers and Consumers, Inc.

CONTINUING EDUCATION FOR COLLEAGUES

LEVELS Program for Avian Veterinarians and Technicians: sponsored by HBD International, Inc. the levels program is a hands on seminar for veterinarians to expand their knowledge of basic avian medicine, care and handling.

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Guidelines for the treatment of neonatal psittacines, Proc Am Assoc Zoo Vet, Tampa, 1983.

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How to manage the sick parrot: what to do until a diagnosis is made; Psittacine radiographic considerations for the avian practitioner; Respiratory diseases in psittacines. Proc

World Sm An Assoc Meeting, Harrogate, England, 1989.

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Preventative Medicine for Amazons. In Stoodley, J.& P. (Eds.): Genus Amazona, Bezels Publications, Lovedean, Portsmith, England. pp. 105-122. 1990.

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Hysterectomies can help certain chronic female problems in pet birds. DVM Magazine, July, 1994.

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Three articles in World Small Animal Veterinary Association Meeting - Durban, South Africa 1995.

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Reproductive and Neonatal Surgery. Symposium on reproductive systems and neonatal diseases, Proceedings 3rd Conference of European Committee of the Association of Avian Veterinarians, Jerusalem, Israel, 1995.

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Psittacine Malnutrition. Transcript First International Invitational Symposium on Exotic Companion Animals, Punta Leona Resort, Costa Rica, April 31-May 5, 1996. Winger's Publishing, Lake Worth, FL.

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Differential Feeding Chart. The Bird Hospital, 5770 Lake Worth Road, Lake Worth, FL 33463, 1996.

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Clinical Parameters for the Blue-headed Macaw. Manfred Hochleithner, Claudia Hochleithner, Greg J. Harrison, The Bird Hospital, 5770 Lake Worth Road, Lake Worth, FL 33463, 1996.

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Exotic Companion Medicine Handbook for Veterinarians. Cathy A. Johnson-Delancy, DVM ed. pub 1996, Winger's Publishing - Thanked in preface.

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Diagnostic Application of Avian Endoscopy CD, Taylor M, Harrison G, Zool. Ed. Network, 1997.

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Polycystic Ovaries in a Cockatiel. Exotic DVM Mag., Vol 1.1 1998 p13.

Tumor and Pygostyle Removal. Proceedings 1999 International Conference on Exotics, Vol 1.3 p41-42.

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Cloacal Prolapse and Papillomatosis in an Umbrella Cockatoo. European college of Avian Medicine and Surgery. Pisa, Italy 1999.

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Physical Examination of the Avian Patient, 1997 AVMA Annual Convention.

Practical Diet Conversion and Why, 1997 AVMA Annual Convention.

Behavior Problems and Modification in the Pet Bird, 1997 AVMA Annual Convention.

Standardization of the Avian Physical Examination. Proceedings 5th Conference of European Committee of the Association of Avian Veterinarians, Munich, Germany, 2001.

Justification for a Standard Physical Examination Form. Abstract - Proceedings EAAV, European College of Avian Medicine and Surgery, Munich, Germany, 2001.

Technician Techniques for Handling and Treating Birds, 73rd Western Veterinary Conference, Las Vegas, Nevada, Feb. 2001.

Avian Diets and Behavior Relationships, 73rd Western Veterinary Conference, Las Vegas, Nevada, Feb. 2001.

Avian Fecal Gram's Stain, 73rd Western Veterinary Conference, Las Vegas, Nevada, Feb. 2001.

The Parrot Physical Exam, 73rd Western Veterinary Conference, Las Vegas, Nevada, Feb. 2001.

A Wellness Practice for Parrots, 73rd Western Veterinary Conference, Las Vegas, Nevada, Feb. 2001.

Gender Issues in Veterinary Medicine and Male Issues. From School to Success. Shaping the Future of Your Veterinary Career. Student AVMA Seminar. U. of Pennsilvania, Philadelphia, March 2001.

Feather cyst JAMS 2004

Clinical Avian Medicine. Vol I & II Spix Publishing Int Inc 3610 S Ocean Blvd # 601 Palm Beach, Fl 33480 2006 clinicalavianmedicine.com

Resolution to the American Veterinary Medical Association's House of Delegates
Submitted by Petition
Position Statement on Force Feeding of Ducks and Geese to Produce Foie Gras

"Resolved that the AVMA opposes the practice of mechanical force feeding of ducks and geese to produce foie gras because of the adverse effects on the birds' health and welfare associated with this practice."

Statement about the Resolution

* Foie gras, literally "fatty liver," is a high-priced gourmet food item sold at a small number of upscale restaurants. The individual livers are worth between $48 to $70 each.
* Foie gras is produced by force feeding ducks three times daily with a high volume of a rich concentrated food for a period of 4 weeks. As the degree of hepatic lipidosis increases, livers expand up to 10 to 12 times normal size and develop liver failure. According to the SCAHAW report (see below) page 42, the liver of force-fed geese is 55.8% fat, as compared to the livers of normal geese which are 6.6% fat; force-fed ducks can have fat compositions as high as 60% of the liver weight. Despite industry claims, this process is not reversible at this stage.
* In addition to hepatic lipidosis, the birds develop a greatly distended abdomen due to the increase in liver size, making ambulation difficult or impossible; it also causes extreme dyspnea since the enlarged livers compress the air sacs and make air exchange difficult. Many birds in the third to fourth weeks show hepatic encephalopathy, marked by opisthotonous, seizure-like activity, and semi-comatose states.
* Necropsies performed on birds from foie gras producers show lesions, including but not limited to: hepatic lipidosis; esophageal trauma secondary to insertion of the feeding pipes (granulomas, fungal and bacterial infections, ruptured esophagi); also fractured limbs, crop impaction, aspiration pneumonia, and ruptured livers. In many cases since the food is observed to be spilling out of their esophagi, mouths, and nares, pathologists have determined that the birds died during the force feeding process.
* This process does not mimic the natural pre-migratory gorging seen in wild migrating ducks. In the natural process and when fed ad lib, birds' livers will not expand beyond twice their normal size. Furthermore, the Moulard species used in foie gras production is a hybrid created by artificial insemination using flightless Pekin females (distantly related to migrating Mallards) and Muscovies (a non-migrating species).
* This process has been determined to be so cruel that it has been outlawed in many countries, including Israel, Denmark. Norway, Germany, Switzerland, the Czech Republic, and most of Austria. It is not practiced in the United Kingdom. In the United States, California has outlawed this practice starting in 2012.
* The European Union's Scientific Committee on Animal Health and Animal Welfare (SCAHAW) produced a report in 1998 that concluded that foie gras production methods negatively impacted the birds' physical and psychological welfare.

We believe that this resolution is in keeping with the AVMA Principles of Veterinary Medical Ethics, which state "Veterinarians should first consider the needs of the patient: to relieve disease, suffering, or disability while minimizing pain or fear."

Name (Please print):____________________________________ Signed:__________________________

Address:______________________________Date: _________AVMA Number(if known):____________

Please return to AVAR, PO Box 208, Davis, CA 95617-0208

BEFORE THE NEW YORK STATE DEPARTMENT OF AGRICULTURE AND MARKETS
Albany, New York

In the Matter of the Petition of THE HUMANE SOCIETY OF THE UNITED STATES, ET AL. for a Declaratory Ruling	)))))))	Index No.

AFFIDAVIT OF TERESA BARNATO

I, Teresa Barnato, am over 18 years of age and am competent to testify. I have personal knowledge of the facts stated below and, under penalty of perjury, being duly sworn, depose and say:

1. This affidavit is based on my personal knowledge, and if called upon to do so, I would be prepared to testify to its truth and accuracy.

2. I am National Director of the Association of Veterinarians for Animal Rights ("AVAR"), a national veterinary medical association representing veterinarians throughout the country, and based in Davis, California.

3. As part of my duties as National Director, during the first months of 2006, I helped to prepare and circulate copies of a petition to the American Veterinary Medical Society entitled "Resolution to the American Veterinary Medical Association's House of Delegates, Submitted by Petition, Position Statement on Force Feeding of Ducks and Geese to Produce Foie Gras." A true and correct copy of that petition is attached hereto as Exhibit A.

4. The petition stated in part that:

> Necropsies performed on birds from foie gras producers show lesions, including but not limited to: hepatic lipidosis; esophageal trauma secondary to insertion of the feeding pipes (granulomas, fungal and bacterial infections, ruptured esophagi); also fractured limbs, crop impaction, aspiration pneumonia, and ruptured livers. In many cases since the food is observed to be spilling out of their esophagi, mouths, and nares, pathologists have determined that the birds died during the force feeding process.

See Exhibit A, paragraph 4.

5. Copies of the same petitions were sent by AVAR to veterinarians throughout the country and, as instructed in the petition, the veterinarians were to return the petitions directly to AVAR.

6. As part of my duties at AVAR, I personally tabulated the return of over 1,600 such signed petitions, evidencing unequivocal support for the statements therein.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this day 5/24/06 /s/ [signature]
Teresa Barnato

Subscribed and Sworn to before me, this day May 24, 2006

Notary Public [signature]

LANDON CLAIR CHRISTENSEN
Commission # 1432476
Notary Public - California
Yolo County
My Comm. Expires Jul 27, 2007

Exhibit A

Resolution to the American Veterinary Medical Association's House of Delegates
Submitted by Petition
Position Statement on Force Feeding of Ducks and Geese to Produce Foie Gras

"Resolved that the AVMA opposes the practice of mechanical force feeding of ducks and geese to produce foie gras because of the adverse effects on the birds' health and welfare associated with this practice."

Statement about the Resolution

* Foie gras, literally "fatty liver," is a high-priced gourmet food item sold at a small number of upscale restaurants. The individual livers are worth between $48 to $70 each.
* Foie gras is produced by force feeding ducks three times daily with a high volume of a rich concentrated food for a period of 4 weeks. As the degree of hepatic lipidosis increases, livers expand up to 10 to 12 times normal size and develop liver failure. According to the SCAHAW report (see below) page 42, the liver of force-fed geese is 55.8% fat, as compared to the livers of normal geese which are 6.6% fat; force-fed ducks can have fat compositions as high as 60% of the liver weight. Despite industry claims, this process is not reversible at this stage.
* In addition to hepatic lipidosis, the birds develop a greatly distended abdomen due to the increase in liver size, making ambulation difficult or impossible; it also causes extreme dyspnea since the enlarged livers compress the air sacs and make air exchange difficult. Many birds in the third to fourth weeks show hepatic encephalopathy, marked by opisthotonous, seizure-like activity, and semi-comatose states.
* Necropsies performed on birds from foie gras producers show lesions, including but not limited to: hepatic lipidosis; esophageal trauma secondary to insertion of the feeding pipes (granulomas, fungal and bacterial infections, ruptured esophagi); also fractured limbs, crop impaction, aspiration pneumonia, and ruptured livers. In many cases since the food is observed to be spilling out of their esophagi, mouths, and nares, pathologists have determined that the birds died during the force feeding process.
* This process does not mimic the natural pre-migratory gorging seen in wild migrating ducks. In the natural process and when fed ad lib, birds' livers will not expand beyond twice their normal size. Furthermore, the Moulard species used in foie gras production is a hybrid created by artificial insemination using flightless Pekin females (distantly related to migrating Mallards) and Muscovies (a non-migrating species).
* This process has been determined to be so cruel that it has been outlawed in many countries, including Israel, Denmark. Norway, Germany, Switzerland, the Czech Republic, and most of Austria. It is not practiced in the United Kingdom. In the United States, California has outlawed this practice starting in 2012.
* The European Union's Scientific Committee on Animal Health and Animal Welfare (SCAHAW) produced a report in 1998 that concluded that foie gras production methods negatively impacted the birds' physical and psychological welfare.

We believe that this resolution is in keeping with the AVMA Principles of Veterinary Medical Ethics, which state "Veterinarians should first consider the needs of the patient: to relieve disease, suffering, or disability while minimizing pain or fear."

Name (Please print):______________________________ Signed:______________________

Address:________________________________Date: _________AVMA Number(if known):____________

Please return to AVAR, PO Box 208, Davis, CA 95617-0208

BEFORE THE NEW YORK STATE DEPARTMENT OF AGRICULTURE AND MARKETS
Albany, New York

In the Matter of the Petition of THE HUMANE SOCIETY OF THE UNITED STATES, ET AL. for a Declaratory Ruling	)))))))	Index No.

AFFIDAVIT OF DR. ROBERT E. SCHMIDT, DVM, PhD, DACVP

Dr. Robert E. Schmidt, being duly sworn, deposes and says :

1. My name is Dr. Robert E. Schmidt. I submit this affidavit in support of the Petition for a Declaratory Ruling, based upon my education, training, experience, research, review of evidence specific to this matter, and where applicable, my personal knowledge.

2. I have been a board certified veterinary pathologist since 1968. I received my DVM from the University of California School of Veterinary Medicine, Davis in 1962. I received an M.S. in anatomic pathology from Michigan State University, a Ph.D. from Oklahoma State University, and completed my residency in pathology at the Armed Forces Institute of Pathology. See Exhibit A, curriculum vitae of Dr. Robert E. Schmidt.

3. I have over thirty-five years of experience in experimental and diagnostic pathology, and have supervised eight veterinarians during their pathology training. I have extensive knowledge of, and experience with, various avian diseases, and have consulted with commercial and academic laboratories, over twenty zoos, and over seven-hundred clinical veterinary practices.

4. I have authored or co-authored over one-hundred papers, fifteen book chapters, and three books on veterinary medicine and/or veterinary pathology (many focusing on avian pathology), including an extensive atlas of zoo animal pathology and one of avian pathology. In 2003 I received the Association of Avian Veterinarians Lifetime Achievement Award for my work.

5. On or about February 14, 2006, I ordered one Fresh Foie Gras (Duck) Grade 'A' liver, , from the website of Hudson Valley Foie Gras, Inc., New York, which was available online.[1] In additon they sent a piece of skeletal muscle.

6. On or about March 18, 2006, I ordered one LaBelle Farms (New York) Foie Gras Grade A liver, which was also available online from the website of Prairie Harvest, Inc.[2] Both samples arrived in a condition sufficient for the analysis that I performed, and their mode of shipment in no way interfered with my anaylsis.

7. Attached hereto is a true and correct copy of the report I prepared regarding my analysis of the liver samples described above, as well as true and correct copies of photos and enhancements of the samples, and I hereby adopt and swear to the best of my knowledge to all statements in that report. See Exhibit B, a true and correct copy of the report of Dr. Robert E. Schmidt ("report"), and photos and enhancements of the samples.

8. In the report I determined that all of the liver samples showed abnormal hepatocytes (liver cells), representing a pathological condition, which would impair cellular functions, and which in turn can lead to clinical illness. This condition, known as hepatic lipidosis or hepatic steatosis, is well documented in published literature, and recognized as a metabolic disease. (Rupley, 1997, pages 293-294, 296; Saif, 2003, pages 1084-1085).[3]

9. Hepatic lipidosis can be accompanied by various clinical sig depression, diarrhea, biliverdinuria, obesity, poor feathering, dyspnea, a enlargement, and via impairment of the liver's function, may lead to hepati with clinical signs of seizures, ataxia, and muscle tremors. (Rupley, 1997

A recent study of hepatic lipidosis in turkeys, which noted that nism by which fatty liver can be produced is enhanced lipogenesis from the liver, concluded that nutritional factors (low-protein an mental factors (high temperature, gorging with feed, lack of ex utbreak of hepatic lipidosis eventually leading to severe liver deg ion in the flocks. (Gazdzinski et al., 1994).

In commercial layer flocks, advanced lipidosis may lead to fatty liver-hemorrhagic and is associated with increased flock mortality (Saif ed., 2003, pages 1082-1083); compared to the hepatic steatosis induced in overfed ducks and geese to produce

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hudsonvalleyfoiegras.com/foiegrasmarket.html

[2] http://www.prairieharvest.com/pantry.html#foie

[3] See Exhibit C, References cited in Dr. Schmidt's affidavit.

foie gras. (Hermier, 1997). In a 2005 study, researchers showed that overfeeding hybrid ducks a carbohydrate-rich corn-based diet induces a de novo hepatic lipogenesis which predominates over dietary lipid intake to change the lipid composition of the hepatocyte plasma membrane. (Molee et al., 2005).

12. Another recent study determined that hybrid ducks overfed with boiled corn develop acute hepatic steatosis, with total lipids 138 times higher in the overfed ducks than in the control group. (Gabarrou at al., 1996, page 478). The researchers also determined in part that the fat release during the exposure of the dissected liver to heat, which is an index of poor liver cell integrity, was high for large livers, and more prevalent in certain species. (Gabarrou at al., 1996, pages 474, 482-483). The study suggested that nutritional deficiency was an inductive factor in the process. (Gabarrou at al., 1996, page 483).

13. On or about April 4, 2005, I received a group of necropsy reports, performed in 2002 and 2003 at Antech labs, New York, and in 20005 at Cornell University, New York, which were titled "NY2003" and "NY2005," respectively. Attached hereto are true and correct copies of these necropsy reports. See Exhibit D, 2002/2003, Antech necropsy reports, and September-October, 2005, Cornell necropsy report.

14. The gross and histologic findings I made regarding the livers I obtained from Hudson Valley Foie Gras, Inc. and Prairie Harvest, Inc. were similar to the primary hepatic findings reflected in the 2002 and 2003 necropsy reports performed by Antech, and 2005 necropsy report performed by Cornell. The liver samples I examined were abnormal as were those in the referenced reports.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on this day 11 May 2006

/s/ Dr. Robert E. Schmidt

Subscribed and sworn to before me, this day

see attached Jurat Certificate

CALIFORNIA JURAT WITH AFFIANT STATEMENT

State of California
County of Siskiyou } ss.

☒ See Attached Document (Notary to cross out lines 1–6 below)
☐ See Statement Below (Lines 1–5 to be completed only by document signer[s], *not* Notary)

1 ______
2 ______
3 ______
4 ______
5 ______
6 ______ Signature of Document Signer No. 1 ______ Signature of Document Signer No. 2 (if any)

Subscribed and sworn to (or affirmed) before me on this 11th (Date) day of May (Month), 2006 (Year), by

(1) Robert E. Schmidt (Name of Signer),

~~☐ Personally known to me~~
☒ Proved to me on the basis of satisfactory evidence to be the person who appeared before me (.) (,)

(and

(2) ______ (Name of Signer),

☐ Personally known to me
☐ Proved to me on the basis of satisfactory evidence to be the person who appeared before me.)

KATHLEEN K. KERNS
Commission # 1540538
Notary Public - California
Siskiyou County
My Comm. Expires Jan 15, 2009

Kathleen K. Kerns
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Further Description of Any Attached Document

Title or Type of Document: Affidavit of Dr. Robert. E. Schmidt, DVM, PhD, DACVP

Document Date: Not Dated Date Signed 5-11-06 Number of Pages: 9 Includes this page

Signer(s) Other Than Named Above: None

RIGHT THUMBPRINT OF SIGNER #1	RIGHT THUMBPRINT OF SIGNER #2
Top of thumb here	Top of thumb here

T6-020 VRT, Department of Biomedical Sciences
College of Veterinary Medicine, Tower Road
Cornell University, Ithaca, New York 14853

607-253-3352 (Phone)
607-253-3541 (FAX)

msn Hotmail®

meghanbeeby@hotmail.com Printed: Wednesday, November 16, 2005 11:52 AM

From : Don Schlafer <dhs2@cornell.edu>
Sent : Tuesday, November 15, 2005 12:43 PM
To : "Meghan Beeby" <meghanbeeby@hotmail.com>
Subject : Re: Question about necropsy report

Ms Beeby,

The shape and appearance of the small lesion in the crop caused us to initially consider the small tissue structure to be a small benign tumor (papilloma). Histopathology (microscopic) examination revealed the area to be heavily infected with fungal hyphae with and associated intense tissue response (granuloma) with tissue response (granulation tissue) that was organized into a polypoid (papilliferous) shape. The bottom line is that the mass was not a tumor, but a chronic focal infection with fungi. Interpretation of the path report can be confusing as it lists the initial gross path findings and the histopathology diagnoses. At the end, the final diagnoses are listed.

Hope this helps,

DHS

Dear Dr. Schlafer,

I have a question about a necropsy report which you worked on for my duck who had to be euthanized. I noticed that the report says the crop had a pedunculated mass likely a papilloma, presumptive. Do you think this was scar tissue and a granuloma infected with fungi? This was case #173915.

Thank you very much for your time.

Sincerely,

Meghan Beeby

344 Halseyville Road
Ithaca, NY 14850

--
Donald H. Schlafer DVM, PhD
Diplomate, ACVP, ACVM, and ACT
Professor of Comparative Reproductive Pathology

Crop: Papilloma, presumptive
Liver: Hepatic lipidosis (presumptive)

Gross Diagnosis
Euthanasia
Ulcerative dermatitis with secondary arthritis
Limb deformity

Comment
Mycoplasma and Pasteurella most commonly affect the joints of birds and a sample of joint fluid is taken to rule out the said causes. The pedunculated mass observed in the crop is likely a papilloma. Hepatic lipidosis observed on the gross examination is likely incidental. However, hepatic amyloidosis can not be ruled out. The carcass was radiographed and the radiologist report is pending.
DHS/cmk 10/6/05

-PE: Bilateral tibiotarsal fractures
Ankylosis and infection of hock joints bilateral
Keel sore
Bumble foot 4th digits bilaterally

-Tx: 9/29 Butorphanol 5.85mg IM breast SID
9/30 Ketophen 1.5 mg 1kg IM breast SID
10/1 Ketophen 1.5mg 1 kg IM breast SID
10/1 Pentobarb 2ml IV Rt ulnar v.

DDX: Bilateral tibiotarsal fractures (trauma, developmental, congenital, metabolic ??)

Paged Dr. Bunting to make sure that this is truly a Private Cremation. lcc 10/1/05 - Private cremation confirmed by Dr. Bunting. lcc

Gross description
This is the carcass of a 3.9 kg, male, intact, duck of unknown age in good body condition with moderate autolysis. There is a keel sore and pressure sores on the 3rd and 4th digits bilaterally. There is moderate roughening of the surface of both the femoral heads (osteoarthritis). Over both the tibiotarsal joints the skin is ulcerated and subjacent dermal necrosis extends to the joint capsule. There is a very small amount of fibrinous tissue in the tibial-tarsal joint (presumptive).

Both tibiotarsi show diaphyseal varus deformities. A section of one tibiotarsus shows an old fracture that has healed at a 45 degree angle and turns medially (varus). The intertarsal joints (hocks) bilaterally have 90 degree rotations, resulting in the plantar surfaces of both feet facing medially towards each other. The other limb is similarly involved (old fracture and distal limb deviation).

There is a 1 x 0.5 x 0.25 cm tan, hard, pedunculated 'almond-shaped' mass attached to the mucosa of the crop (papilloma, presumptive). The liver is mildly enlarged and is slightly yellow (hepatic lipidosis, presumptive). There is a 3 x 4 cm area of hemorrhage in the left pectoral muscle (injection site, presumptive).

Gross Findings
Tibiotarsal joints: Bilateral chronic arthritis and ulcerative dermatitis
Tibiotarsus: Healed fractures (bilateral) and resulting varus rotation Femoral Heads: Moderate Bilateral osteoarthritis

CORNELL UNIVERSITY - COLLEGE OF VETERINARY MEDICINE

VETERINARY MEDICAL TEACHING HOSPITAL

NECROPSY REPORT

Case #: 173915 Species: Avian	Admission Date: 10/3/05 Discharge Date: 10/3/05
Owner: Beeby,Meghan C	Clinician(s): Morrisey,J
Address: 344 Halseyville Rd Ithaca, NY 14850	Service: Ultrasound/Radioloç Location: Referring Vet:
Phone(s): (607) 387-3079, (607) 227-3669	Reason for Visit: Radiographs only
Patient: Damon	Discharge Status: Euthanized 10/3/2005
Breed: Other Duck	
Color: White	
DOB: Sex: Unknown	

Method of Death: **Fatal Plus**
Date/Time of Death: **10/1/05** Necropsy #: **N05-295**
Exam Type: **GH** Diag Lab #:
Date/Time of Exam: **10/4/05** Previous #(s):
PM Interval: **3 day(s)** Related #(s):
Body Weight: **3.9 KG** Receipt Date: **10/3/05**
Duration of Illness: Finalized:
Animals Housed: Prosector: **Palyada,K.**
Animals Affected: **1** Path-in-charge: **Schlafer**
Animals Died: **1** Student: **Greenberg**
Copy(s):
PM Test(s):

Tissues
Crop ; G
Liver ; G
Joint ; G

Diagnoses

Antem (2491-4160.0) Fracture tibiotarsal
Gross (1100-1000.9) Ulcerative dermatitis,skin disease,dermatosis
Gross (0Y00-8023.A) Papilloma A
Gross (2370-4160.0) Fracture tibia
Gross (2480-6102.X) Rotation laxity tibia, stifle joint
Gross (2400-9120.0) Osteoarthritis multiple joints
Gross (2400-9300.0) Arthritis due to unknown
Gross (6800-9170.0) Lipidosis liver
Gross (0100-3000.X) Death due to euthanasia

Malignancy Codes	
A - Benign - no premalignant significance	B - Benign - having premalignant significance
D - Neoplasm - malignancy not determined	E - Malignant neoplasm - non-infiltrating
F - Malignant neoplasm - differentiated	G - Malignant neoplasm - undifferentiated (anaplastic)
H - Malignant neoplasm - differentiation not determined	I - Malignant neoplasm - metastatic site

History:
-Duck found abandoned on porch by Mrs. Beeby abandoned.

request blood was submitted for a complete blood count and chemical analysis. The chemistry panel was within normal limits.

Due to the poor prognosis, the owners consented to humane euthanasia.

Diagnoses: right pelvic limb: proximal and distal tibiotarsal fractures
left pelvic limb: midshaft tibiotarsal fracture
Bumblefoot bilaterally
Pressure sores on both hocks and on the keel

Procedures: Emergency visit, physical exam, pain management, CBC, blood chemistry, euthanasia

Medications: In hospital, ketofen 1.5 mg/kg for pain

Prognosis: grave for ambulation

Thank you for caring so much for Damon. We regret we could not do more for him.

Thank you for bringing Damon to the College of Veterinary Medicine for treatment. We hope that you have been satisfied with the service, treatment, and billing procedure. If you wish to discuss these matters, please feel free to contact us.

Susan Bartlett

Owner/Agent	Clinician Electronic approval on 10/1/2005	Chief of Service

CORNELL UNIVERSITY HOSPITAL FOR ANIMALS
(607) 253-3060

STATEMENT OF DISCHARGE
Discharge Date: 9/30/2005

Entry Date: 9/30/2005

Case #:	173915	Species: Avian		Owner:	Beeby,Meghan C
Patient:	Damon			Address:	344 Halseyville Rd
Breed:	Other Duck				Ithaca, NY 14850
Color:	White			Phone(s):	(607) 387-3079
DOB:		Sex: Unknown			(607) 227-3669
Referring Vet:				Referring Vet Phone:	
Reason for Visit:				Fax:	

Admission Date: 9/29/2005
Clinician: Perchick, Jonathan; Bartlett, Susan
Chief of Service: Abou-Madi, Noha
Student: Lupo, Deborah
Service: Emergency SAC

Problems: Unable to ambulate, chronic malunion fracture of pelvic limbs bilaterally, bumble foot bilaterally on 4th digits, pressure sores on hocks and keel, pale mucous membranes

Visit Summary:

Damon was presented 9/29/2005 in the evening to Cornell emergency. Damon was found by Mrs. Beeby on her porch when she arrived home from work. He was breathing heavily, panting, had diarrhea and could not walk. She tried to offer water but he was not interested and then was brought directly to Cornell.

On physical exam Damon was bright, alert and responsive. His weight was 3.9kg, pulse 216 bpm, pale mucous membranes and respiratory rate was 24 bpm. He was moderately conditioned with a fair amount of flesh surrounding his keel. He has pressure sores on both hocks and his keel. The hock joints were firm and enlarged and fixed in a bent position (ankylosed). There were bilateral tibiotarsal fractures that had healed in an abnormal position. On the right pelvic limb there were proximal and distal tibiotarsal fractures and on the left limb there was a midshaft tibiotarsal fracture. There was hyperplasia and black pigmentation of the tissue on the plantar (bottom) surface of both feet (Bumble Foot) associated with the 4th digit and metatarsal pad.

Damon remained is the hospital overnight. Pain medication was administered intramuscularly (torbugesic 1mg/kg). Fresh water and feed was offered. Damon began to drink immediately.

9/30/2005: Damon was bright, alert and responsive. No additional findings on physical exam from yesterday were noted. 1.5mg/kg of Ketoprofen was administered intramuscularly.

10/1/2005: Damon was bright, alert and respomsive. No additional findings on physical exam from the previous day were noted. Heart rate was 272 bpm, his mucous membranes were pale, and the respiratory rate was 24 bpm. Damon had very green feces today which was very foul smelling. 1.5mg/kg Ketoprofen was administered intramuscularly. Damon can not walk and is very stressed when handled even a small amount. As Damon's quality of life is very poor humane euthanasia was suggested to the owner as an option. Since Damon can not walk he will continue to have pressure and rub sores on his hocks and keel. These wounds are very susceptible to infection. As per the owners

Susan Bartlett

Owner/Agent	Clinician	Chief of Service
	Electronic approval on 10/1/2005	

Accession No.	Doctor	Owner	Pet Name
S3654017	SIEMERING	SHAPIRO	MULLARD 2

Test Requested	Results	Reference Range	Units

The kidney is mildly congested and autolyzed but otherwise unremarkable.

Microscopic Findings:
1. Severe fatty change with mild chronic active cholangiohepatitis, liver.
2. Severe congestion with mild to focally moderate chronic active bronchiolitis, lung.
3. Mild congestion and autolysis, kidney.

Comment:
Liver fatty change is consistent with the clinical history of being force-fed. The inflammation around portal triads contains some granulocytic infiltrates and the possibility of a low grade systemic infection cannot be excluded. The inflammation around bronchioles probably reflects environmental conditions. No overt evidence of infection is seen although a few granulocytes are identified.

Anne L. Kincaid, D.V.M., Diplomate A.C.V.P.

ANTECH DIAGNOSTICS 1111 Marcus Avenue Lake Success NY 11735 Phone: 800-872-1001

The Exotic Pet Clinic
7297 Commerce St
Springfield, VA 22150
Tel: 703-451-3414
Fax: 703-866-4926

Client # 1497
Chart #

Accession No.	Doctor	Owner	Pet Name	Received
53654017	SIEMERING	SHAPIRO	MULLARD 2	01/22/2003

Species	Breed	Sex	Pet Age	Reported
Avian		U		01/30/2003 02:31 PM

Test Requested	Results	Reference Range	Units

BIOPSY
Biopsy
Microscopic Description: Liver: The liver parenchyma shows diffuse hepatocellular swelling and hepatocellular vacuolation compatible with fatty change. Some portal tracts show infiltration of lymphocytes and plasma cells with scattered heterophils. Scattered heterophils are also seen in some sinusoidal spaces. Vascular congestion is also evident.
Lung: The lung parenchyma shows marked vascular congestion. Multifocal infiltration of plasma cells and lymphocytes with scattered heterophils and rare macrophages are also seen in some areas of the lung parenchyma.
Kidney: The renal parenchyma shows moderate autolysis and congested blood vessels.

Diagnoses: 1. Liver: A) Diffuse hepatocellular vacuolation compatible with fatty change. B) Mild subacute pericholangitis.
2. Lung: Subacute pneumonia.
3. Kidney: Vascular congestion and autolysis.

Comment: Fatty change is a nonspecific lesion. It can be seen associated with anorexia, toxic, a metabolic disease, etc. The inflammatory changes seen in the portal tracts and in the lung parenchyma are nonspecific. They could be associated with Chlamydia, an underlying bacterial infection, etc.
ADDENDUM: The lesions observed in the liver could possibly have been caused by high-fat content in the diet.

Byron Ruiz, D.V.M.

Supplemental Report:
Recuts of the liver, lung, and kidney are received for a second opinion. The tissues are from a Mallard duck which was being force-fed. Necropsy lesions are not described.

The liver shows diffuse severe lipid swelling of hepatocytes. Mild periportal infiltrates of lymphocytes, plasma cells, and fewer granulocytes are identified. No microorganisms are present.

The lung is severely congested. Mild to focally moderate peribronchiolar inflammation is present representing lymphocytes, plasma cells, histiocytes, and a few granulocytes. No other changes are seen.

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Client # 1497
Chart #

Accession No.	Doctor	Owner	Pet Name	Received
S3654017	SIEMERING	SHAPIRO	MULLARD 2	01/22/2003
Species	Breed	Sex	Pet Age	Reported
Avian		U		01/27/2003 10:05 AM

Test Requested	Results	Reference Range	Units

BIOPSY

Biopsy

Microscopic Description: Liver: The liver parenchyma shows diffuse hepatocellular swelling and hepatocellular vacuolation compatible with fatty change. Some portal tracts show infiltration of lymphocytes and plasma cells with scattered heterophils. Scattered heterophils are also seen in some sinusoidal spaces. Vascular congestion is also evident.

Lung: The lung parenchyma shows marked vascular congestion. Multifocal infiltration of plasma cells and lymphocytes with scattered heterophils and rare macrophages are also seen in some areas of the lung parenchyma.

Kidney: The renal parenchyma shows moderate autolysis and congested blood vessels.

Diagnoses:
1. Liver: A) Diffuse hepatocellular vacuolation compatible with fatty change. B) Mild subacute pericholangitis.
2. Lung: Subacute pneumonia.
3. Kidney: Vascular congestion and autolysis.

Comment: Fatty change is a nonspecific lesion. It can be seen associated with anorexia, toxic, a metabolic disease, etc. The inflammatory changes seen in the portal tracts and in the lung parenchyma are nonspecific. They could be associated with Chlamydia, an underlying bacterial infection, etc.

Byron Ruiz, D.V.M.

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The Exotic Pet Clinic
7297 Commerce St
Springfield, VA 22150
Tel: 703-451-3414
Fax: 703-866-4926

Client # 1497
Chart #

Accession No	Doctor	Owner	Pet Name	Received
S3654008	SIEMERING	SHAPIRO	MULLARD 1	01/22/2003

Species	Breed	Sex	Pet Age	Reported
Avian		U		01/24/2003 03:23 PM

Test Requested	Results	Reference Range	Units

BIOPSY

Biopsy

Microscopic Description

The specimen consists of necropsy tissues representing liver, kidney, and lung. The tissues are from a Muscovy Peking cross breed duck which was being force fed. At necropsy, bumblefoot was present, the duck was extremely overweight, and had dirty plummage. The liver was very enlarged and fatty and huge amounts of intracoelomic fat were present.

The liver shows diffuse severe lipid swelling of hepatocytes. Mild to moderate inflammation is present around portal triads representing lymphocytes, plasma cells, histiocytes, and granulocytes. No microorganisms are identified.

The kidney has mild multifocal interstitial infiltrates of lymphocytes and plasma cells. The lung is severely congested. Very mild peribronchiolar infiltrates of lymphocytes are present. However, the lung is incompletely sectioned due to sectioning artifact.

Microscopic Findings:

1. Severe fatty change, liver.
2. Mild to moderate chronic active cholangiohepatitis, liver.
3. Mild chronic interstitial nephritis, kidney.
4. Severe congestion with mild chronic bronchiolitis, lung.

Comment:

The fatty change in the liver is consistent with the clinical history of force feeding. Significant periportal inflammation is present suggesting systemic infection possibly from the bumblefoot. Inflammation is limited in the kidney. Changes in the lung are nonspecific although the bronchiolitis may reflect environmental conditions. Deeper sectioning of the lung is in progress and any significant changes will be noted in a supplemental report.

Anne L. Kincaid, D.V.M., Diplomate A.C.V.P.

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Tel: 703-451-3414
Fax: 703-866-4926

Client # 1497
Chart #

Accession No.	Doctor	Owner	Pet Name	Received
S3530440		MOOSE	DUCK	12/21/2002

Species	Breed	Sex	Pet Age	Reported
Avian		F		12/27/2002 05:37 PM

Test Requested	Results	Reference Range	Units

BIOPSY

Biopsy

Microscopic Description:

The specimen consists of necropsy tissues representing lung, liver, and kidney. The tissues are from an adult female duck which was being force fed corn.

The lung is severely congested with mild to moderate hemorrhage and edema in bronchioles. Droplets of eosinophilic proteinaceous and fatty material are present in the bronchioles with mild to focally moderate infiltrates of granulocytes and histiocytes. No microorganisms are identified.

The liver shows severe lipid swelling of hepatocytes. Small foci of hematopoiesis are present around portal triads representing myeloid and erythroid precursors. Rare minimal periportal infiltrates of lymphocytes and plasma cells are also noted.

The kidney has very mild multifocal interstitial infiltrates of lymphocytes, plasma cells, and a few granulocytes. No other changes are identified.

Microscopic Findings:

1. Aspirated food material with mild to moderate subacute hemorrhagic bronchiolitis, lung.
2. Severe congestion, lung.
3. Severe fatty change, liver.
4. Minimal chronic cholangiohepatitis with mild patchy extramedullary hematopoiesis, liver.
5. Mild multifocal chronic active interstitial nephritis, kidney.

Comment:

Lung morphology is consistent with aspiration pneumonia. Fatty proteinaceous food material is present with bronchioles. The severe fatty change in the liver is consistent with the clinical history of being force fed. Inflammation in the liver and kidney is limited and probably not clinically significant.

Anne L. Kincaid, D.V.M., Diplomate A.C.V.P.

REPORT NOTES:

LIVER LUNG KIDNEY

Exhibit D

Exhibit C

References cited in Dr. Schmidt's affidavit:

1. Gabarrou, J.F., M.R. Salichon, G. Guy, and J.C. Blum. Hybrid ducks overfed with boiled corn develop an acute hepatic steatosis with decreased choline and polyunsaturated fatty acid level in phospholipids. Reprod. Nutr. Dev. 36:473-484. 1996.

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There is usually hyperlipidemia and the normal mechanisms for clearing fat from the hepatocytes are overwhelmed which can lead to the histologic and gross appearance of the livers examined.

Although hepatocytes with excessive lipid are still viable, they are not normal and represent a pathologic condition that may lead to impaired cellular functions which in turn can lead to clinical illness. Primary metabolic disease associated with diminution of hepatic function is possible, and fat infiltration in to the skeletal muscle in one indicaton of possible systemic derangement in lipid metabolism. Secondary diseases, including infections are also possible in a debilitated animal and could infect any organ or organ system.

The gross and histologic findings in these livers were similar to the primary hepatic findings in the reports identified as NY2003 and NY2005 reports.

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Mr Carter Dillard
HSUS

Species: Avian-Ducks

History: Ducks force-fed to produce foie gras.

Samples: Three samples examined, two from Hudson Valley Foie Gras and one from Prairie Harvest.

Hudson Valley. Submitted was a whole unfixed duck liver and a piece of skeletal muscle. Grossly the liver was enlarged and pale yellow-tan [Figure 1]. Scattered small red foci were noted. Histologically there was diffuse swelling and vacuolation of hepatocytes [Figure 2]. In the skeletal muscle there was mild separation of myofibers and infiltration/proliferation of adipocytes [Figure 3].

Prairie Harvest. Submitted was a whole frozen duck liver. It was grossly enlarged and pale tan-cream. [Figure 4] Histologically freeze artifact was present and hepatocytes were swollen and vacuolated [Figure 5]. Sections stained by the oil-red-O [ORO] method were diffusely positive for fat [Figure 6].

Comments: Both livers were obviously enlarged, pale and friable which are typical characteristics of excessive fat. The histologic appearance of both livers was also typical of excessive fat and this was positively seen with the ORO stained sections. The amount of fat noted in these livers was definitely abnormal.

There are a variety of mechanisms that allow accumulation of excessive fat in hepatocytes. One of these is excessive fat and calories in the diet.

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