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## *Literature Review on the Welfare Implications of Foie Gras Production*

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### **FOIE GRAS**

Foie gras (fatty liver) is a food product traditionally produced using geese, but now more commonly using ducks; production in the United States uses only ducks. It is consumed primarily at festive events in France, and as a gourmet product in many other countries, including the United States.

The mechanism underlying the development of a fatty liver is common to many avian species. Lipogenesis occurs in the liver and fats are then transported to other parts of the body via the blood. With increased food intake fat may build up in the liver. In ducks liver size will fluctuate seasonally, increasing by as much as 30 to 50%, with more pronounced changes in females.<sup>1,2</sup> Steatosis (fatty infiltration) can be produced to a much greater degree in some domestic duck breeds (those with a reduced capacity to secrete hepatic lipids) by feeding maximal amounts of a high carbohydrate diet.

Ducks used for foie gras production are hybrid Muscovy/Pekin (Mulard) drakes raised in barns until plumage develops, provided a period of free access to food such as outdoor grazing, and then held in pens and force fed for a final fattening period of between 17<sup>3</sup> and 30<sup>4</sup> days. Force feeding is necessary to produce the size and fat content that makes a liver 'foie gras.' The unctuous meat of the ducks is also sold as *magret*, *aiguillette*, and *confit*.

### **FOIE GRAS PRODUCTION IN THE UNITED STATES AND OTHER COUNTRIES**

France is the largest producer and consumer of foie gras. American farms produced 340 tons in 2003<sup>5</sup> and supply most of the domestic market where foie gras is sold predominantly through restaurants.<sup>6</sup> Foie gras is produced by two companies in the United States: Hudson Valley Foie Gras (NY) and Sonoma Foie Gras (CA). Foie gras production has been banned on animal welfare grounds in many countries, including Israel,<sup>7,26</sup> which possessed an active foie gras industry producing as many as 500 tons of foie gras annually. Within the United States production or sale of foie gras may be limited in some jurisdictions. For example, a ban on the force feeding of ducks and geese has been signed into law in California and took effect in 2012.

### **WELFARE CONCERNS—SCIENCE, RISKS, AND SEVERITY**

Foie gras production attracts greater criticism than other poultry operations based largely on the practice of force feeding and resulting effects on the liver and overall health of the birds. Empirical research addressing the health and welfare state of the bird during this process is limited in both quantity and quality.

**Force feeding**—Force feeding is possible with ducks as they are able to swallow large food items and so possess a relatively large and robust esophagus, the capacity of which can be further increased with repeated filling. During fattening a 6- to 10-inch long tube is inserted into the esophagus and withdrawn, dispensing up to 450 grams per meal, typically with 2 or 3 meals per day.

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The degree of discomfort experienced during force feeding and immediately afterward while the esophagus is distended remains unclear. Capture and restraint are stressful to ducks and rapid insertions of the feeding tube provide opportunities for injury and therefore pain. There is some indication of inflammation of the esophagus in the later stages of force feeding.<sup>8</sup> Ducks may demonstrate a degree of aversion to sites where they are force fed even when the amount fed is at ad libitum rather than commercial levels.<sup>9</sup> Ducks avoid a force-feeding handler less than an unknown person,<sup>9</sup> however this finding does not establish force feeding is entirely benign as ducks are highly stressed by the presence of unfamiliar handlers.<sup>4,9</sup>

Studies conducted at the French national Institute for Agricultural Research (INRA)<sup>10,27</sup> found that plasma corticosterone concentrations of force-fed ducks were below those of ACTH-challenged ducks and not reliably above observed baseline concentrations. Researchers have used similar analyses of corticosterone concentrations to support the hypothesis that housing ducks in small cages for foie gras production leads to no adverse animal welfare consequences. Unfortunately, such analyses do not account for other important measures of animal welfare, such as presence or absence of enclosure-related injuries or ability to perform natural behaviors. Similarly, the discomfort experienced during force feeding may vary greatly depending on handler skill, animal temperament, and whether injured animals are immediately identified and removed.

Force feeding overrides animal preference and homeostasis. Although ducks may, under some conditions, voluntarily consume large amounts of food, if force feeding is interrupted they will fast for a period of 3 days or longer,<sup>11</sup> indicating that ducks have been fed past the point of satiety.

**Physical condition**—Breeds of waterfowl differ greatly in their propensity to develop liver steatosis.<sup>12</sup> The Mulard duck used in foie gras production exhibits a marked tendency to accumulate fat in the liver<sup>13</sup> and not elsewhere in the body.<sup>14</sup> This tendency is exploited by feeding a diet high in carbohydrate and low in choline (which is required for the metabolism of fat).

During fattening liver size increases up to 10-fold.<sup>15</sup> Lipogenesis exceeds secretion, so the resulting liver contains more than 50% fat.<sup>15</sup> The liver has reduced function to the extent that blood flow is reduced and hepatocyte function is impaired.<sup>16,17</sup> It is reported these effects would progress and cause death if force feeding was continued,<sup>18</sup> but that they are also reversible.<sup>20</sup>

Increased liver weight is accompanied by a substantial overall live weight gain (in the range of 85%).<sup>21</sup> Obesity influences behavior as fattened ducks are less active and exhibit increased panting in an effort to avoid over-heating.<sup>8,27</sup> The ducks' plumage may develop a wet or greasy appearance. Anecdotal observations by members of the European Scientific Committee on Animal Health and Welfare suggest fattened ducks also demonstrate abnormalities in standing posture and gait.<sup>18</sup> Mortalities have been attributed to some ducks becoming immobile and therefore unable to access water.<sup>19</sup>

Limited mortality figures are available for ducks used in the production of foie gras and it is difficult to find a reasonable baseline for comparison in terms of breed, age, housing, and duration of force feeding. The European Scientific Committee on Animal Health and Animal Welfare review<sup>18</sup> indicates that mortality during the force feeding period is typically 2 to 4%; the Institut Technique de l'AViculture (Technical Institute of Poultry Farming) reports a figure of 2 to 5%.<sup>21</sup> Given that this relates to the 2- to 4-week fattening phase of production, this phase seems to result in mortality equivalent to the entire 12-week production period of ducks grown for meat, including the vulnerable post-hatching period.

**Associated housing and handling**—Foie gras production practices may interact with other general rearing practices with consequences for animal welfare. For example, in the United States ducks are fattened in group pens, which provide opportunities for social behavior. However, the increased effort required to capture and restrain ducks in pens might cause them to experience more stress during force feeding.<sup>27</sup> Also, although injuries and fatalities during transport and slaughter occur in all types of poultry production, fattened ducks are more susceptible to conditions such as heat stress. The relatively new Mulard breed used in foie gras production seems to be more prone than its parent breeds to fear of people,<sup>22</sup> developing lesions in the area of the sternum when kept in small cages, and to bone breakage during transport and slaughter.<sup>23</sup>

## ALTERNATIVES TO FORCE FEEDING FOR PRODUCING FOIE GRAS

There is no current alternative to force feeding that produces an equivalent product. One company reports it is able to produce goose foie gras seasonally by taking advantage of the goose's motivation to gorge prior to a migratory period.<sup>24</sup> It has been suggested that future research might develop means to directly induce fattiness or interrupt normal satiety signals through surgery, pharmaceuticals (e.g., arsenic<sup>25</sup>), breeding, or increasing feed palatability.<sup>19</sup> Alternative systems would need to be investigated for potential animal welfare impacts, and concerns associated with the resulting obesity would remain.

## SUMMARY

It is presumed that under ideal conditions a force-fed duck will not experience injury or liver necrosis, will retain the ability to stand and move around, and can be transported to slaughter without injury. In the absence of empirical studies the welfare of this ideal animal is difficult to judge, as is the prevalence of more severe compromises to welfare.

The known potential risks associated with foie gras production, are:

- Potential for injury due to multiple insertions of a long feeding tube, with possibility of secondary infection;
- Distress from restraint and manipulations associated with force feeding;
- Compromised health and welfare resulting from obesity, including the potential for impaired locomotion and lethargy; and
- Creation of a vulnerable animal more likely to suffer from otherwise tolerable conditions such as heat and transport.

Some of these risks can be mitigated by effective management. There is evidence of industry efforts to use modern feeding equipment, improve feed tube design and provide ducks with a familiar handler. Other refinements might include immediate identification and removal of injured animals and moderation of feeding levels to strike a balance between product yield and animal welfare.

The few empirical studies that have been conducted would benefit from validation of method, more robust use of controls, and independent replication. There is a clear and pressing need for research that focuses on the condition of ducks during fattening, including the actual incidence and severity of animal welfare risks on the farm. This would allow deficits to be accurately identified and ameliorated. Until this occurs, estimates of the welfare condition of ducks used to produce foie gras will be approximate, based upon the severity of the manipulations (force feeding) and resultant deviations from normal health (marked obesity).

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